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*Causes that determine the difficulties in the onboarding process of ICT in classrooms*

# SELF-PERCEIVED LEVEL OF PERFORMANCE BY FUTURE PRESCHOOLER TEACHERS REGARDING THE USE OF ICT<sup>1</sup>



Nivel de desempeño autopercebido por futuras educadoras de párvulos sobre el uso pedagógico de TIC

Competências do século xxi: como desenvolvê-las através do uso de videogames em um contexto multigrau?

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## ABSTRACT

The purpose of this article is to analyze the factors that determine the difficulties of incorporating ICT in the classrooms of educational institutions in the city of Riohacha - La Guajira. It is a descriptive type of study, with non-experimental and field design, used the technique of personal survey, field work and observations within educational facilities. The results of the analysis conclude that the problems for this incorporation come fundamentally from the formation of teachers, the infrastructure that the classrooms must have and the level of management of tools that the teacher must acquire for the society in which we find ourselves. On the other hand, there are not enough economic resources for the acquisition, maintenance, and continuous training in ICT, which makes many teachers refuse to use new educational technologies.

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## RESUMEN

El propósito del presente artículo es analizar los factores que determinan las dificultades de la incorporación de las TIC en las aulas de clases de las instituciones educativas de la ciudad de Riohacha - La Guajira. Es un estudio de tipo descriptivo, con diseño no experimental y de campo, se utilizó la técnica de la encuesta personal, trabajo de campo y observaciones dentro de las instalaciones educativas. Los resultados del análisis concluyen que los problemas para esta incorporación provienen fundamentalmente de la formación de los docentes, la infraestructura que deben tener las aulas y el nivel de manejo de herramientas que debe adquirir el profesor para la sociedad en que nos encontramos. Por otra parte, no existen recursos económicos suficientes para la adquisición, mantenimiento, y capacitación continua en TIC, lo cual hace que muchos docentes se rehúsen a utilizar las nuevas tecnologías educativas.

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## RESUMO

O objetivo deste artigo é analisar os fatores que determinam as dificuldades de incorporação das TIC nas salas de aula das instituições de ensino da cidade de Riohacha - La Guajira. É um tipo de estudo descritivo, com desenho não experimental e de campo, utilizado a técnica de levantamento pessoal, trabalho de campo e observações dentro das instalações educacionais. Os resultados da análise concluem que os problemas para esta incorporação vêm fundamentalmente da formação de professores, da infra-estrutura que as salas de aula devem ter e do nível de gestão das ferramentas que o professor deve adquirir para a sociedade em que nos encontramos. Por outro lado, não há recursos econômicos suficientes para a aquisição, manutenção e treinamento contínuo em TIC, o que faz com que muitos professores se recusem a usar novas tecnologias educacionais.

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## **INTRODUCTION**

Recently, technological education has improved its ITC learning processes, establishing a challenge that requires quick, effective and exact actions, as stated by Muñoz (2011), which would in turn drive academic and methodological transformations in an educational framework, creating didactic strategies that enable the adaptation of educational systems and the anticipation of proposals to face future changes, thus defining a new role and function for teachers in the implementation of educational technology.

ICT implementation in the educational sphere calls for a new type of student and teacher. According to Riveros and Mendoza (2014) ICT demands the existence of a new nature of the didactic and methodological process that is customarily used in educational centers, one in which responsibility does not fall on the teacher exclusively and in which the student is not a mere receptor of information.

According to Jimenez (2010) it is very important to drive a change in the use of ICT in teachers' pedagogical processes and in students' participation since students may safely and quickly understand and handle computing technologies while matching technologies with their technological training interests in the classrooms. Schools were made to teach (among others) the mysteries of reading and writing, an early form of decoding and coding message content, respectively.

For Contreras, Contreras and Gonzalez (2013), cited by authors Gonzalez and Leon (2010), technological advancement, especially that of ICT, has influenced many fields including the

educational field, in which change is already evident, e.g., blackboards and markers being replaced by multimedia projectors (video beams), as well as bulletin boards and copy centers being replaced by virtual spaces and e-mails to encourage real-time communication.

“Usage of ICT in teaching-learning processes is similar to the increase and enhancement of computational offer, removal of space and time boundaries, ease in collaborative work or increase in learning flexibility; they all crystalize in the demand of methods and resources previously established to attain total learning.” (Cuberos, Sanchez, Ortega, Garces and Martinez, 2016, p. 114).

According to UNESCO (2013) ICT inclusion in the educational sector in Latin America and the Caribbean has failed to report positive effects on quality, implying that elements such as meaningful learning and student motivation must be taken into account in the educational process.

Indeed, institutions must adjust the convergence between traditional education and the implementation of new technologies (adequately used by teachers) otherwise, they may lead to great weaknesses in the educational process inside and outside classrooms.

Public sector's educational institutions must not be on the fringes of ICT; Fabres, Libuy and Tapia (2014) explain that, on the contrary, it is in their best interest to be informed and appropriate these support tools to aid the teacher with the new way of teaching, orienting ICT usage in the classroom with well-defined strategies and actions will favor these technologies in educational processes.

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According to Marques (2008) ICT implementation in education is highly necessary due to several factors: changes in curricular content that demand comprehensive and continuous training throughout life; penetration of new technological tools; permanent alignment of ICT's basic competences, both for the face-to-face and virtual modalities; and as a guarantee of continuous training of teachers and students in public educational institutions.

Sanchez, Moreno and Torres (2014) believe that nowadays it is necessary for teachers to remain up-to-date and to appropriate ICT tools in order to implement them in the classroom. An analysis of the reports developed by Riohacha's municipal Secretary of Education and Culture in 2014 evinces that most teachers in public educational institutions are unprepared to use and apply ICT in classrooms.

Consequently, it is imperative that public educational institutions reveal the difficulties they face in teacher implementation regarding usage and handling of technological tools, aimed at gathering relevant information to develop training proposals and pedagogical strategies that lead to improved educational quality and proper ICT implementation.

Thereunder, the general objective of this article is to identify the factors that determine the difficulty of ICT incorporation in classrooms by teachers in educational institutions in Riohacha; to generate strategies that lead to the improvement of pedagogical practices to develop proposals oriented towards the teachers' professional training, and to undertake the required physical adaptations within

all of the classrooms in the public sector's educational institutions.

the mobilization of those skills and dexterities that allow seeking, critically selecting, obtaining and processing relevant information by using ICT to transform it into knowledge, while being able to communicate it using different technological and digital supports, acting responsibly, respecting pre-existing social norms and taking advantage of these tools to acquire information, learn, solve problems and communicate in different interaction scenarios (Flores, 2015, p. 27).

## ***THEORETICAL FRAMEWORK***

Morales, Trujillo and Raso (2015), regarding difficulties of using ICT in teaching, mention that it is important for today's teachers to have the disposition and learning techniques that insert them in continuous training to ease the transition to ICT incorporation in the classrooms. Moreover, a technological profile analysis can be applied to teacher's practices in order to detect factors that might affect the thinking skills developed by teachers with the use of technology (Said-Hung, Valencia-Cobos and Señan, 2017).

Arceo (2010) thinks teachers must have disposition to learn in order to establish a link with the contents of the school's curriculum and pertaining to provide a theoretical foundation for their proposals, especially from constructivism's standpoint and considering the city's public institutions' educational phenomena. The study *Usos y abusos de las TIC en los adolescentes* shows that: "Good usage of ICT by teachers is summed up in actions connected with school and learning activities, communication and interaction with other people, entertainment, creativity, curiosity

and research development, all of which are important to the extent that they assist the teenager to think and create their own identity through the information they access. Teenagers give ICT very positive reviews associated with functionality, speed and ease, the bottom line is they help make their live better.” (Sallan and Mercader, 2018, p. 138).

Moreover, Cabero (2007) believes that an adequate usage of ICT (as tools and means for didactic resources) generates pedagogical development in the classrooms; further consideration of a much-needed educational scenario reconfiguration requires training and refinement of the educational and administrative environment, in order to create a different and favorable learning environment.

Rivero (2012) remarks that copious cases exemplify the benefits of incorporating ICT to different sectors, such as education, productive development, reproduction of economic exchange, democratic dialog and exercise, multiplication of spaces (faster each time) and cultural access and exchange channels, among others, in sectors that seek technological development advancement.

From this perspective, Rueda (2006) proposes that even though the computer arrived in Colombia twenty years ago, educational policies in this field still focus on equipment provision and access. To obtain a true critical integration of technology in the educational contexts, it is critical to connect human capital with new technological advancements and to train them in usage in the classrooms of the country’s educational institutions. According to Montes and Machado (2011) educational skills and strategies cannot be held accountable for the institution’s educational problems, furthermore, often times they enhance

the problems, e.g., when the teacher abandons ICT educational practice in classrooms due to the lack of tools and physical spaces required for the tasks. Another study entitled *Estructuras docentes en grados de Arquitectura: Metodología basada en las TIC e innovacion docente* illustrates:

“The bottom-up trend in the index of passed students and quality suggests an increase in the number of students that are admitted. It may be concluded that the use of ICT-based methodology entails more implication and motivation of the subject by the student, favoring continuous weekly work and thus achieving learning.” (Ruiz-Jaramillo and Vargas-Yañez, 2018, p. 353).

Professional training of teachers in classroom technology integration demands teachers to perform new roles, transform their practices with new ideas that successfully answer the demands of the 21<sup>st</sup> century’s society, nourishing growth, as well as social and cultural development, as Becerra (2006) explains.

UNESCO (2013) expresses that ICT inclusion in the educational sector in Latin America and the Caribbean has failed to report positive effects on quality, implying that elements such as meaningful learning and student motivation must be taken into account in the educational process.

### *DIFFICULTY OF ICT INCORPORATION*

“Failing to use the latest technology makes a person incompetent, and traditional technologies are a bother are common misconceptions that require clarification in terms that not even the most innovative ICT intends to replace traditional technologies, nor to create a virtual environment in which there is only room for digital in the

pedagogical process within the classroom” (Cabero, 2007).

On the other hand, the literature review found a study that values collaborative work in teaching-learning processes in schools with high ICT levels, it validates the following:

“Teachers’ conceptions are not always connected with their practice and show certain degree of incoherence, given the large number of teachers that fail to propose collaborative activities in their classrooms, despite having a positive opinion of this methodology. This fact may be explained by shortages in collaborative work strategies and tools, and by excessively traditional routines focused on teacher explanations and the use of a textbook.” (Muñoz-Repiso and Tejedor, 2018, p. 171).

According to Ruesa (2006) favorable attitudes towards ICT by teachers were found in the Colombian case, without significant differences in the variables of gender, age or training level; it was also found that schools don’t have many computers, locations are not adequate and the institutions’ physical infrastructure is not fit for the learning process.

“The new information age has brought development of strategies intended to improve the teaching-learning processes in the classroom. ICT (an enhancement instrument for said processes) enables design and implementation of new classroom plans by teachers to fulfill student training demands.” (Monsalve y Monsalve, 2015, p. 53).

Gonzalez, Padilla and Arias (2010) consider the technological boom (b-learning in particular) is such that it is becoming an alternative to facilitate the integration of new technologies and cultures with traditional teaching methods.

Moreover, Guerrero and Bravo (2013) comment that it is possible to combine face-to-face and non-face-to-face resources in different proportions, the

teacher’s role shifts from a transmitting agent to a mediator in the construction of new knowledge.

Author Coll (2007, p. 2) states that “with the purpose of best valuing ICT’s transforming potential and its proven difficulties in making it a reality, a distinction between techno-pedagogical design and usage practices will be introduced, and a draft of the identification and analysis scheme for ICT usage will be proposed.”

For Arevalo and Gamboa (2015) ICT-based policies have established that education is a fundamental element to move into an information society, emphasizing that ICT is a key factor to do so, as well as training citizens to respond to the needs of contemporary society.

### *PROFESSIONAL TRAINING LEVELS*

Author Touriñan (2007) believes ICT has reached maturity levels, which allows us to demystify technology in itself, since research data points to the importance and necessity of technological changes, with the objective of improving educational processes as high-quality institutions. Additionally, the same author states that the main problem is not essentially technical or financial, but a matter of pedagogical and educational policy of public and private institutions.

For Cabero (2007) strategies are becoming more and more complex because many are framed in paradigms regarding how and why to teach using technological mediation.

“These new teaching strategies are configured in the evolution of communicational actions, role

significance and interaction between subjects that engage in any training process.” (Garrido, 2005).

## *TECHNOLOGICAL INFRASTRUCTURE*

According to what has been established by Touriñan (2007) conducting ICT integration in education will necessarily imply considerable economic investment in technological and physically-adapted spaces that are enough for the educational centers servicing students and teachers, among other measures.

Going back to Moreira (2005) the creation of educational telematic networks (useful to drive research concepts in the classroom) develops training strategies for the teachers, impacting skill training and development that concern ICT in education applying available resources at educational institutions.

Likewise, Ramirez (2010, p. 2) adds: “ICT has become one of the main foundations of society, they are applied in every field and this reality makes its use in education necessary.”

For Entonado (2001) technology information and knowledge are disseminated via technological tools; incrementally, we are getting immersed in the digital, virtual and innovation world in classrooms, which puts teachers in sync with this century’s education.

Therefore, on this particular (handling technological tools in the classroom’s pedagogical practice) Perea (2014) emphasizes that research shows the importance of teacher training,

classroom infrastructure, and level of tool handling required of the teacher by today’s society.

## *METHODOLOGY*

This research is based on methodological tools implemented using the scientific method, thus, it requires an epistemological approach, paradigm, research type and design, population, as well as information collection techniques and instruments. Author consultation was an additional resource in the process, aimed at contrasting reality and reaching the objectives of the study, all of which led to pertinent conclusions and recommendations.

The framework of the research is descriptive, it has a non-experimental field design in order to detect the factors of the difficulty of ICT incorporation in classrooms. In terms of the population, it focused on the public educational sector, which comprises 41 educational institutions and 1,520 teachers (distributed per teaching level) according to the information provided by the Secretary of Education and Culture of the Mayor’s Office of Riohacha in the year 2016.

The sample implied random work among 152 teachers in the survey, which accounts for ten per cent (10%) of the teachers in educational institutions of the public sector in the city of Riohacha in 2016.

Probabilistic sampling was chosen because it reduces forecast error size to a minimum. Moreover, data collection and analysis were conducted using statistical tools and techniques: personal survey, field work and observations within educational facilities.



The questionnaire included 20 questions to obtain information connected with the objectives of the research. A data collection instrument was designed to gather information and measure the 'difficulties of ICT incorporation in pedagogical processes' variable, as well as dimensions and indicators of the variables; the instrument was structured and not disguised, it included YES and NO dichotomous questions.

Each answer alternative was given a weighting value, this with the aim of getting to know the situation of ICT usage in educational institutions, as the following table shows.

Table N° 1. Weighting of the answer alternatives.

SCALE	SCORE
YES	1
NO	0

Source: Sierra (2016).

Information collection is one of the most significant aspects of a research process, thus, its reliability and validity determine the process' success (Hernandez, Fernandez and Baptista, 2014).

The instrument's reliability calculation (Tamayo, 2012) was validated with an analysis by three experts in the fields of technology and innovation in the educational area. Reliability was determined applying a pilot sample by taking 5% of the subjects under investigation and applying Cronbach's alpha, resulting in a 0.95 reliability, considered to be high. Analysis of the gathered information was interpreted through descriptive statistics.

## RESULTS

These results coincide with the feelings of teachers in public educational institutions in Riohacha regarding ICT incorporation in the teaching and training process. The following is an example of behaviors, opinions and reactions of the survey takers in the analysis.

Speaking of applicability, incorporation and handling, similarities were found with the results obtained by Cabero (2007), he proposes ICT incorporation as a didactic tool does not always signify pedagogic innovation, but that currently, the use of technological tools in pedagogical processes has driven new learning strategies; however, educational institutions must encourage optimization of their methods.

A detailed analysis was conducted for each specific objective applied to the research's instrument: difficulties, professional training and technological infrastructure, which (according to the experts who assessed the instrument) are valid due to their connection with the topic under investigation. This implied a statistical analysis of the trends of each teacher in their area of work, and of the physical

Panorama | Mendez (2012) believes reliability and validity are  
 pp. 32-41 | important at the time of the operation of the  
 Volumen 12 | research, therefore, the designed instrument was  
 Número 22 | subject to a validation process using the expert  
 Enero-Junio | judgement technique, in which PhD experts  
 2018 | assessed the instrument from a theoretical and  
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conditions of each educational institution in Riohacha.

Table N° 2. Variable's structure chart.

<i>VARIA</i>	<i>DIMEN</i>	<i>INDICATORS</i>
<i>BLE</i>	<i>SION</i>	
ICT implementation in the classrooms.		Competitive level
		Implementation
	Difficulties	Equipment handling and usage
		Teachers' training
	Professional training	ICT seminars
		ICT training
	Technological infrastructure	Computer room
		Computers
		Networks

Source: Sierra (2016).

Regarding the needs of ICT handling and application, it was found that 73% of the teachers have difficulties based on lack of knowledge, and 27% mention not having any difficulties.

It must be mentioned that educational institutions do not have the resources to implement ICT, are yet to define them as institutional policy and teachers fail to have the competitive level required for ICT usage, as the research's results show.

In terms of ICT implementation in educational institutions, it can be observed that 87% of the teachers understand the importance of ICT tools in the teaching-learning process, while 13% disagree with this idea.

The analysis on handling technological tools in the classroom shows that 85% of the teachers affirm not having the skills to apply them into pedagogical processes, and 15% claim to use these tools.

On the other hand, 20% of the teachers say they have had professional training, while 80% haven't. It was clear that the teachers who have not been trained in ICT are not undertaking adequate activities, generating and transmitting few technological knowledge to their students in the academic processes.

It is important to consider teachers' professional training in offering courses on technological tools, since statistic results of this question show 92% of them believe it was necessary to take courses of this nature as aid to their tasks in and out of the classrooms; 8% of them disagree with these measures to aid ICT implementation.

Public educational institutions in Riohacha do not have resources of their own because the Secretary of Education is responsible for supporting all of the educational institutions, therefore, many institutions can not depend on themselves.

The aspect of teacher motivation in ICT use training reflects that 93% of the teachers are interested in improving their ICT knowledge, while 7% believe that it is not just up to the teacher to have motivation, but it also concerns directors and administrative staff, who usually fail to show interest in these new pedagogical processes in classrooms.

According to the results, 90% of teachers think computer rooms are not adequate in terms of spaces and areas for ICT-based teaching, and 10% claim

to have adequate computer rooms (this last figure corresponds to institutions that are main branches).

Regarding the indicator of the number of pieces of equipment used in computer rooms in educational institutions in Riohacha, 90% of the teachers believe the equipment used to apply ICT tools are not enough for the students which generates a problem (since the ratio exceeds 8 students per computer). The remaining 10% is satisfied with the equipment in their institution's computer room (taking into account that these are institutions with a small number of students).

The results regarding Internet usage in the city's educational institutions show that 80% of the facilities are not equipped with the correct computer tools to service students and teachers, while 20% of the schools have good band width service.

This research evinces that many schools in the city's educational system lack adequate physical spaces and networks in computer rooms, and for handling ICT in and out of the classrooms.

## **CONCLUSIONS**

Depending on the factors that determine the difficulty of ICT incorporation in classrooms, the teacher will have to assume a commitment and ethically enforce his/her power to decide. This entails becoming part of updating processes, seminars, training and academic training pertaining ICT incorporation in his/her pedagogical process.

The analysis of the competitive level in terms of handling and using ICT by teachers in Riohacha's

educational institutions shows that 73% of them have difficulties with these topics, which consequently means a continuous improvement of teachers' educational processes is unlikely.

However, a mid to long-term project to access ICT could be devised, contemplating training and technological education programs; these processes imply that students would largely benefit.

It is important to state that the methodologies in different educational environments lead to improved quality and teachers' competitiveness level, which is why this research intends to highlight, motivate, confront and encourage an adequate implementation and use of ICT tools to aid in the development of new capacities in teachers.

Equipment handling and use in ICT implementation helped identify the difficulties to consider by teachers to face a technological challenge in the educational aspect, such as the pedagogic appropriation of ICT, innovation in learning materials and constant training in pedagogical processes.

Regarding the design and implementation of a teacher training program, statistical results showed that 80% of them declared not having received adequate training in the matter.

ICT usage in the analyzed contexts is seen as an aid for teachers, and they feel it is necessary to stop believing ICT is the enemy that will displace the teachers' daily tasks. Still, public educational institutions are failing to offer seminars and courses on ICT handling and improvement to the teachers,

despite the fact that 92% of them wish to participate in them.

On the other hand, it was found that institutions have failed to provide adequate physical spaces or computer rooms for the use of technological tools, which means that many teachers and directors have low level of knowledge on ICT. Likewise, in terms of the operation, results show little or no maintenance being done on existing equipment. Referring to the computer rooms of the city's public educational institutions, 90% of the teachers claim that they do not have enough equipment and that infrastructure is unsatisfactory.

Also, many schools do not have proper networks and physical spaces to implement ICT: the number of computers is insufficient, the physical space is not adequate, the location is not feasible and teachers are not being correctly trained for their pedagogical tasks.

As a result of the research's development on the causes that determine the difficulty of ICT incorporation in the classroom within teaching-learning processes, it is critical to consider a strategic training plan on the use of technological tools aimed at shifting the teachers' role into multipliers of ICT experience and use. To do so, the roles of educational institutions (committed with these programs) is fundamental, along with the support of the government and state entities, such as the Secretary of Education of Riohacha.

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