EFFECT OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN THE DEVELOPMENT OF READING AND WRITING SKILLS. EXPERIENCES IN BASIC AND SECONDARY EDUCATION IN COLOMBIA

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Abstract

The development of reading and writing skills is very important for any citizen in the knowledge society. Without this development, it is not possible to have successful improvements in the rest of the knowledge areas. Many actors in Colombia (Governments, Universities, Schools and others) have made efforts to improve the teaching-learning processes, however the impact has been low. The low levels in international tests (e.g.: PISA-OECD), the low levels in Colombian Government tests (Saber 11), the low reading and writing capacity of the students that reach higher education, among other aspects are indicators that these efforts have not been enough. This paper presents a research proposal where was observed the results of 19 learning experiences with incorporation of educational technology in basic and secondary education. The experiences were developed between 2015 and 2018 by 35 teachers of Spanish Language. Those activities were developed at 8 Colombian departments of the country with more of 650 students. The research methods of these experiences are: Qualitative (12), Quantitative (3) and Mixed (4). Among the most used instruments is the survey, the interview, the direct observation and the field diary. Regarding the most used technological mediations with greater effect are: Educational web portals, educational software, mental maps, digital boards and interactive videos. The most important results were: Every variable like academic performance, student motivation, attitude, among others, have been improved. The teaching-learning process takes place between two main actors: teachers and students. However, the review of several of the experiences of this text shows the intervention of a third actor (student's family), which becomes a key factor to enhance literacy skills. Finally, correct activity planning, the diversity and the creativity of the activities are key factors to promote the development of literacy skills.

Keywords: ICT, reading and writing, basic education, educational innovation, literacy.

1 INTRODUCTION

The development of literacy skills is considered one of the pillars for a citizen, to let them provide an integral contribution to society’s knowledge and their attempt to improve the quality of their education [1]. If these skills don’t reach an adequate level, it won’t be possible to achieve new improvements in other areas. In a society, based on knowledge, literacy skill determines the success everyone will achieve to join the society. These skills are key to generate skills to interpret knowledge, create new knowledge, ideate new mediums to improve communities and achieve the world’s sustainability [2].

Nowadays, the significance of reading and writing ideas can’t be more relevant [3]. As a matter of fact, the only way to ensure that everyone will be capable of learning and improving each part of their lives depends on their capacity to choose, interpret and apply this high-quality information and knowledge. Today, many careers are disappearing and then rebuilt in a matter of months. These individuals must be prepared to exercise new careers, developing search, selection and application strategies for this new and relevant information required for the upcoming necessities.

It isn’t possible to aspire to deliver finished and packaged knowledge, because, at the end of the education cycle of the individual, their knowledge will be completely obsolete. As you can see, in following this context, there must be some changes in the way students approach this change, the uncertainty, complexity and the crisis in all ambits of life [4]. Students must learn to work in fields that do not yet exist, using knowledge that hasn’t been created yet. That said, this is meant to create proficiency to access and interpret high-quality scientific information, and to better organize and interpret information. The skill to learn to learn, the skill to work as a team, the skill for critical thinking, the skill to innovate, and the skill to make ideas a reality, all these are part of a new revolution in the
way we use information. Each day new careers are created; old jobs and occupations are disappearing. Likewise, in the document “Objectives for a Sustainable Development for the Millennium, presented by the Program on Development of the United Nations - PNID [5], shows that at world scale, 6 of 10 children and teenagers aren’t achieving a decent literacy skill level. Also, there are some big gaps countries and continents. These gaps, as quoted by the National Literacy Plan, are also present in Colombia, due to the existence of a great heterogeneity in learning results of many regions, communities and educational centers [6].

In [7] is discussed how this problem can be addressed using new pedagogies and the emerging technologies; that proposes a change in the way how the teacher and the student thematic works, as well as the conception of said knowledge. [8]-[11] are some important experiences that highlight the significance of these new settings, strategies, and technological learning tools; which are required when thinking in innovative didactic processes. In these environments, the teacher is no longer the only source of knowledge. The teacher works more like a guide, a consultor that provides many opportunities to reinterpret and grow with the knowledge found on the internet and with the knowledge that they can interpret.

This is a project currently taking place in Colombia, a country located in the northern part of South America. While there are many improvements in educational and technological aspects, there are still many inequalities and gaps blocking the access to high-quality education for a greater part of its inhabitants. Reason for an increasing number of people more interested in improving the quality of their education. For the last couple years, Colombia started gaining a newfound interest in the way they measure the quality of their education, by participating in many international tests, allowing them, not only to get an idea of the quality of the education they provide, but also allowing them to compare themselves with other countries. The results of said tests, mostly regarding writing, aren’t that positive. Both in the tests for the Program for the International Evaluation of Students - PISA and the tests from the Progress in International Reading Literacy - PIRLS, the results place Colombia in spots that aren’t consistent with the regulations and investments provided by the Government, to improve the quality of education. This can be seen in the following lines. Colombia participated, for the first time, in the PISA tests in 2006 [12]. The 2012 test, consisted of questions, sectioned by six levels of complexity. In the same year, 85000 students, from 44 countries, took an evaluation test, with a maximum score of 500 points. Colombia took last place with an average of 399 points [13]. From the 9073 students coming from the cities of Medellin, Manizales, Bogotá, and Cali, only 1,2% of the students answered the questions from the tests with the highest levels of complexity, the 5 and 6. Even worse, only 61% of the students answered the questions found in the level 2 test.

On the other hand, since 2001, Colombia has participated in the PIRLS tests. These are the rates used in these tests: Advanced (> 625 points), High (550 to 625 points), Medium (475 to 550 points) and Low (400 to 475 points). Colombia got 448 points, positioning itself below the PIRLS. Unlike Hong Kong, who had first place, with 123 points. The results for the Colombian students reveal a high motivation for reading, with 87%, 10% moderate motivation and 3% showed no motivation at all. The motivated kids got 457 points, the moderately motivated kids got 417 points and the non-motivated kids got only 397 points. However, the results for the motivation to read, are mediocre. The trend for low performance is evident in the points obtained in the Colombian state-owned tests, known as SABER 11. In Table 1, you can see the language results from 2009 to 2017:

<table>
<thead>
<tr>
<th>Year</th>
<th>National Average Score</th>
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<tbody>
<tr>
<td>2009-I</td>
<td>46,14</td>
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<tr>
<td>2009-II</td>
<td>48,68</td>
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<tr>
<td>2010</td>
<td>50,01</td>
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<td>2011</td>
<td>46,03</td>
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<td>2012</td>
<td>46,5</td>
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<td>2013</td>
<td>47,23</td>
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<td>2014</td>
<td>50,16</td>
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<tr>
<td>2015</td>
<td>49,7</td>
</tr>
<tr>
<td>2016</td>
<td>52,6</td>
</tr>
<tr>
<td>2017</td>
<td>54,29</td>
</tr>
</tbody>
</table>

Table 1. National Scores in Prueba Saber 11 Language Area
In this table you can see, if there is an increasing trend in the last decade of these results, this can’t be observed regarding the efforts and investment provided by the government. Another thing to consider, as synthesized in [14], there’s a big gap between public and private schools. According to this article, the Top 2018, shared by the Sapiens Research firm, from a total of 854 students positioned in this ranking, only 45 are public schools (officials), making them only the 0.5% of all the schools of said nature in the country.

All these elements motivated the authors, who made this contribution, to create a research proposal to observe the results of the use of pedagogic strategies, using information and communication technologies, in teaching and learning the processes of literacy skills. The initiative, focused on the academic processes of the Masters in Educational Technology Administration Program of the Universidad de Santander-Colombia, focused on the formation of teachers in basic, middle and higher education services in Colombia. The project, allowed to mainly determine four aspects: a) more relevant problems in literacy in basic and middle education institutions in Colombia, b) the Main theory and conceptualized references for each specific sub-subject, c) The most used information technologies in intervention experiences and d) Pedagogic and organizational findings. These aspects will be detailed in the following sections.

2 METHODOLOGY

The development of the present investigation project, took place from a set of experiences of pedagogic interventions, developed by the teachers in services of the program of the Masters in Educational Technology Administration of Universidad Santander, between the years of 2015 and 2018. 35 Spanish speaking teachers and 650 students from 8 Colombian states participated in this project. Each one of the experiences was independently created, mostly using an investigation-action, descriptive and quasi-experimental design. The systematization process phases of these will be described in the following phases:

2.1 Phase 1 - Selection of Pedagogic intervention experiences

The research team made an announcement for the selection of said pedagogic intervention experiences, resorting to an information registration format. The thematic axes, chosen for the experiences were: Incorporation of ICT in teaching-learning processes and evaluation of media and processes in public sector organizations. Each one of these proposals required the following elements: introduction, issue and context, objectives, theory references, methodology, description of the proposal, results obtained, impact and bibliographic references.

There’s also a new evaluation rubric with the following criteria:

- Clarity of the experience: The experience shows consistency, cohesion, and pertinence in the elements that compose it.
- Compliance of the delivery norms: The delivery of archives of the experience must comply with the norms set by the announcement.
- Descriptions of the results: The experience describes with detail the results obtained during investigation process.
- Quotation and bibliographic references: The experience makes correct use of the theory sources, through the correct application of the norms or quotations and APA references.

The minimum score for each of the pedagogical intervention experiences to be accepted in the study was 85/100. There were 30 experiences of which 19 were selected. These are:

- Narrative production: the story, a challenge from cooperative learning
- Development of communicative skills in elementary school students, based on the use of the digital dashboard tool- Centro Educativo Fabián Sebastián Jiménez case (Marinilla - Antioquia)
- Comprehension of narrative text, fables, with Issuu in students of the fifth grade of elementary school
- Encourage the reading of texts in third grade children through new pedagogical strategies through educational applications in Power Point.
• Development of linguistic competences with Cuadernia (digital notebooks) in the fifth-grade children of the Vista Hermosa de Soledad-Atlántico Educational Institution.

• Implementation and evaluation of a virtual environment for the improvement and strengthening of language in grades 3, 4 and 5 Sacred Heart of Jesus Florida Valley.

• Strengthening the learning dynamics of reading in preschool, integrating information and communication technologies- Case IE Departmental Technical Roque de los Ríos Valle (Retén, Magdalena)

• Instructional design of web 2.0 tools in text comprehension processes in the third grade of primary school

• Improvement of the skills associated with the oral presentation, mediated by tic, of eleventh grade students of the La Floresta agricultural educational institution, municipality of Sapuyes - Nariño.

• Blog for the strengthening of reading comprehension in the area of Spanish in sixth grade students of the I.E. Paulo VI of the city of Palmira - Valle.

• Articulation of the areas of ethics, Spanish language and technology and information technology, as a pedagogical strategy for the construction of life projects

• The mental maps as a strategy to improve the reading ability of expository texts in the tenth-grade students of the Isabel Valbuena Cifuentes School in the municipality of Velez-Santander.

• Incorporation of ICT as a methodological tool to improve the reading comprehension process

• Improve reading skills of the sixth grade, of the Santo Angel de Bucaramanga Santander Institute.

• Implement the Webquest virtual tool to improve reading comprehension and textual production in the students of the San Luis School in Aratoca and the Padua de Onzaga Educational Institution in the Department of Santander.

• Optimization of the hip-hop language to potentiate the communication skills of the students of the San Francisco IED School in Ciudad Bolivar in Bogotá D.C.

• Use of the Smart Notebook 11 tool to strengthen the reading of students with cognitive deficit in the primary elementary school of the citadel of the south, see mirror port. (Armenía Quindío).

• Development of socio-adaptive skills mediated by ICT, in the pilot group of children with special educational needs of the Educational Institution Municipal Council of Itagui, Antioquia.

• Reading process through interactive readings in elementary students with mild special educational needs, from the Jorge Eliécer Gaitán Ayala Educational Institution - Atanasio Girardot headquarters in Villavicencio.

2.2 Phase 2 - Experience Sistematization

We used the systemization of experiences to get the main features. The education level of the intervention, the geographic precedence of each experience, the most important theory references that support the initiatives, the problems addressed by literacy skills were analyzed, and the technological tools used to measure the education and the main results

2.3 Phase 3 - Documentation and analysis of the findings

We documented all the important experiences in the book Las tecnologías de la información y las comunicaciones (TIC) en el desarrollo de competencias lecto-escritoras en educación básica y media. Sistematización de experiencias en Colombia [15]

The document structure and the description of each section are shown here:

• Presentation: General description of the investigation, from the research group in charge and the program of the Masters in Educational Technology Administration.

• Starting point: Description of the literacy problem, reflections about the use of technology to overcome educational gaps and international panorama in the technological implementations en educational processes.
3 RESULTS AND DISCUSSION

In this section, we present the results of the research process.

3.1 First Characterization of the experiences of the educational intervention

In terms of geographical distribution of the experiences, there are initiatives in 8 of 32 Colombian states. Those states are: Antioquia, Atlántico, Caquetá, Cundimarca, Huila, Magdalena, Meta, Nariño, Quindío, Santander and Valle del Cauca. 54% of the interventions in urban areas and 47% in rural zones. We had the following distribution according to the educational levels: First infancy (1), Basic Primary (9), Basic Secondary and Middle School (7) and Special Needs Education (2). That said, regarding the type of technologies used in this outlook is quite wide; showing that the act of pedagogic innovation, isn’t focused on a limited set of tools. There are experiences with digital presentation tools (PowerPoint and Prezi), Web Sites Designs and Educational Virtual Objects, blog, digital notebooks, Webquest, digital tablets, cuadernia, Hot potatoes, among others. This will be explained in detail in the following section.

3.2 Analysis of the Addressed Problems

The problems linked with literacy skills, that are the origin of these proposals for intervention, are mainly expressed under the low academic performance of the students in the area, through the results obtained in institutional tests, in statewide tests or in the case of students with special needs education. The low performance compared with the rest of its class group. The low academic performance can be observed in the performance in the student’s interpretative, propositive and argumentative skills, according to the proposed elements in the national norm by the Ministry of National Education. Some jobs are especially focused on the interpretation and comprehension of texts, at literal, inference, critical and intertextual levels. Other tasks come from the problems in the processes of textual production, at the semantic and synthetic; as well in aspects of calligraphy, the use of orthographic norms and punctuation marks. Also, some experiences are addressed with problems focused on failures in the student’s oral expression and that are looking to provide tools to facilitate the organization of ideas for expression.

The identified causes for the low academic performance are centered in the following two sets of aspects: the institutional and the student. In the institutional aspects, the following can be identified: the existence of inappropriate spaces to advance the learning processes, the inadequate use of didactic strategies, that are reflected in a monotonous classroom, and teachers not planning their courses accordingly. On the other hand, in the student’s aspects, the following things are mention: the low understanding of the significance of literacy skills by the parents, their low educational level and a high index of poverty, that can be seen in rural areas of the country, this can negatively impact the student’s education. Also, many internal aspects can be present, such as shyness, the fear of public speaking, the lack of reading habits, the lack of motivation and the monotonous perception of this area. Finally, in the cognitive student’s aspects, we can find the low lexicon and the lack of ownership of the semantic and syntax aspects of language.

Separate matters, constituted by the experiences addressing the people with Special Needs Education, we can see that these are generally discriminated, and institutions are also lacking the tools to diagnose and intervene with this inhabitant in a correct manner, given the huge disparity of diagnosis that include the incapacity or cognitive deficit, hemiparesis, hyperacusis, low vision, neuromuscular lesion, Asperger’s syndrome, autism, among others; and a lack of understating about the possibilities that this technology can offer to support them.
3.3 Theory aspects of literacy with ICT

The identification of the involved theory aspects in the experiences, provide a great variability of referent authors, but concentrated in reduced thematic, that are addressed in the theory aspects: ICT, Learning and linguistic Skills as fundamental thematic axes, however, the integration of a pair of concepts and in some cases the insight on each one, also generate a set of referent authors.

In the analysis of referenced authors in a first axes that include ICT, Learning and the link between ICT and its impact on learning, the wide gamma of learning theories linked in the experiences are highlighted, with a special preference for the important learning of Ausubel, Novak and Hanesian [16], the linking of Vygotsky with the sociocultural theory [17] and Bandura an Walters with social learning [18]. It becomes evident that the interaction with the context and with the others, for the cognitive development and thus the role language play. In this thematic axis, Gangé is also linked [19], who, even if he doesn't directly address a learning theory, provides a theoretical framework for the instructional design.

After addressing the relation between the linked authors as theory references to the thematic axes, Learning, Linguistic Skills and Development of the linguistic proficiency, some proposals are shown, that study the concept of the linguistic proficiency as defined by Chomsky [20] “The innate capacity every human being has to talk and create messages that they have never heard before” and Cassany [21] that defines language as a “communication tool and as a tool for the organization of thoughts”. On the other hand, Gardner [22], stresses the importance of linguistic proficiency in the framework of multiple intelligences, considering as the most universal and shared among the human species.

Above all the approaches associated to Learning of the linguistic skills, fundamental in the development of this project, the following is highlighted: Eggen and Kauchak [23] state that the collaborative learning promotes collaboration, asking for students to share their new ideas with other students in their group. On the other hand, Teberosky & Tolchinsky [24] recommend the rewriting of texts to facilitate the comprehension of the literary language and the writing system, so as Solé [25] provides the reading phases: before the reading, during reading and after reading, as well as the identification of the three levels of reading comprehension: literal, inferential and intertextual critic. Also, Orozco [26] the need to recognize the implicit elements in the text and in [27] the role of prediction and the anticipation in reading is shown, as internal processes that facilitate the interpretation.

Finally, to address the link between the thematic axes of ICT and linguistic proficiency in the thematic axes of ICT for the development of linguistic skills, two thematic lines are identified: one that privileges the description of technological tools and their contributions to the achievement of these proficiencies and, a set of theoretical references focused in the potentialities or damage that the ICT could generate, particularly in the case of literacy. The outlook of theory references, depicted in the experiences, allows us to identify the need to select a set of the most theoretical currents from the investigation processes developed in the Master of Educational Technology Administration, to systematically provide in the six (6) identified thematic axis: ICT, Learning, Linguistic Proficiencies and ICT for the development of linguistic proficiencies. This favors the consolidation of an institutional proposal of incorporating ICT for the development of literacy skills.

3.4 Methodological approaches for the investigation in reading writing

Regarding the selected methodological approach, we have: 12 Qualitative, 4 Mixed ones and 3 . Regarding the design, we have 7 Experiences with Action-Participation Research, 7 Descriptive and 5 Quasi-experimental. The instruments with more recurrence in the experiences are: field diary, polls, interview, documents, focal group, workshops, literature, narratives, observations, reflections, and recordings.

3.5 ICT and the way to use it

In general terms there’s a set of experiences that implement, software tools from different types and specific hardware (computer hardware, projectors, digital tablets, among others) These were the tools used: 5 Blogs/web portals, 4 Virtual learning Objects/educational software, 4 mind and conceptual maps, 3 office automation tools, 2 digital tablets, and 1 media in YouTube.

That said, is possible to highlight the recurrence of experiences towards the work dynamic of blogs or web portals for the interaction/mediation between students, and among students and teachers. This significance is shared with jobs found in literature, such as the one presented in [28], they show
development in literacy skills that were made dynamic with these types of tools (adding wikis as another media). Another experience that shares the importance of using blogs and the media from other sharing tools is the proposal for teaching Spanish, as a second language, shown in [29]. The link shown between the blog and the strengthening of the textual production of students shown in many of the experiences of this book is consistent with previous results, such as the ones shown in [30].

On the second instance, we can find the use of Virtual Learning Objects and educational software, developed by the authors of these initiatives, that show interesting levels of ownership and acceptance in this population. In this case, it is important to highlight what was exposed by [31] who consider the development of dynamic and flexible OVAs as a very important step, prioritizing the pedagogic aspects above the technological ones, and maintaining a clear focus in the context where they are implemented, because technical difficulties (mainly accessibility and devices) are constant in many of the educational institutions of Colombia. Finally, it is shown that the tools, such as the mind maps, conceptual maps and the administration of tasks and resources through WebQuest, is a trend in the investigation that has been done in the literacy area. This experience is consistent with the results shown in the revision of the literature of [32] and chapter shown of [33], [34].

4 CONCLUSION

The research allows the profiling of different methodological strategies and approaches, addressing problems existing in the Colombian educational institutions, mainly associated with literacy skills. It’s possible to synthesize the main findings of the revision in the following lines:

- The experiences shown demonstrate, to be qualitative or quantitative, that the associated variables to the analyzed literacy skills (academic performance, motivation, aptitudes, performance among others) have improved to enhance the teaching-learning process in the Colombian educational institutes. While the demographic spectrum (ages and school grades) allow the enhancing of elements such as: oral expression, calligraphy, use of orthographic norms, interpretation and text production, semantic elements, syntactic and pragmatics, among others.

- The teaching-learning process is directly and evidently driven between two main players: teachers and students. However, the revision of many of the experiences of the present text, show how the intervention of a third player (student’s family), becomes a key factor to enhance the literacy skills. This has a clear foundation in that the skills developed in the classrooms, and in other situations for human interaction. Thereby, it is crucial to motivate parents, teaching them that the learning processes are a key factor for students in the literacy area, to stimulate the development of skills.

- The aspect of the technological infrastructure (physical spaces, hardware devices, software, and connectivity) in the involved institutions in the revision done, is another element that comes, in many cases, as an obstacle for the development of interventions with greater quality and depth. Associated to this element, it is also necessary to identify the existing potentialities and generate capacitation and sensibilization processes in the use of the tools, because it is demonstrated the lack of use in the presented cases.

- The correct planning in the intervention, diversity, and creativity of the activities the teachers develop with the students, these are factors that in many of the revised , are quoted as key factors to enhance the development of the skills and proficiency of reading-writing. These observations demonstrated in the experiences, highlighted the motivational and attitudinal aspects of the students, and were developed from the innovating proposals of the traditional reference framework.

ACKNOWLEDGEMENTS

The authors of this proposal want to thank Universidad de Santander, and especially the Center of Virtual Education for their economic support to start this research. We also thank each coauthor who participated in the specific pedagogic interventions, the base for the presentation of these results.

REFERENCES

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