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TEACHER'S PREPARATION IN ICT AND ITS VALUATION IN THE FORMATION OF CABIN BOYS IN ELECTROMECHANICAL TECHNOLOGY FROM THE NON-COMMISSIONED OFFICER NAVAL SCHOOL OF BARRANQUILLA

Marlon Jesús Angulo Cétarez
Non-Commissioned Officer Naval School ARC Barranquilla, Electromechanical Technology, Academic Department (Colombia)
marloncetarez@gmail.com · https://orcid.org/0000-0003-0310-6110

Abstract. A teacher's preparation is demanding, not only requiring the appropriation of a specific knowledge of teaching, but the development of communication skills for the management of ICT (Information and Communication Technologies) as well. A continuous interaction with cabin boys (newly admitted students who last two years in the Non-Commissioned Officer Naval School) should be sought at the work site and wherever they are. This article, as a result of research in the Electromechanical Technology of the Non-Commissioned Officer Naval School of Barranquilla, presents the teachers' preparation and how they perceive it within their teaching activities. The 24 teachers in technology have been used as a population, of which 12 teach in subjects directly related to the use of ICTs, and so comprising this study and therefore representing the sample. Information was taken from the teachers, technology program manager, cabin boys, the Statistics Department and the Telematics Department. The results show teachers with good levels of ICT training and a favorable perception in their use. A tendency to stay permanently updated is observed; however, there are some specific cases that prove otherwise. It is recommended to continue monitoring these processes by applying it to the other technologies and training schools of the National Navy.

Keywords: E-learning, cabin boy, ICT, West point**.**

PREPARACIÓN DEL PROFESORADO EN TIC Y SU VALORACIÓN EN LA FORMACIÓN DE LOS GRUMETES DE LA TECNOLOGÍA ELECTROMECÁNICA DE LA ESCUELA NAVAL DE SUBOFICIALES DE BARRANQUILLA

Resumen. La preparación del docente es exigente y no sólo basta con apropiarse de un conocimiento específico de enseñanza, sino que requiere del desarrollo de habilidades comunicativas para el manejo de las TIC (Tecnologías de la Información y la Comunicación). Se debe buscar una interacción continua con los grumetes (estudiantes recién ingresados que duran dos años en la Escuela Naval de Suboficiales) tanto

en el sitio de trabajo como en cualquier lugar donde se encuentren. Este artículo, como resultado de una investigación en la tecnología Electromecánica de la Escuela Naval de Suboficiales de Barranquilla, expone la preparación de los docentes en TIC y cómo éstos las perciben en las actividades de enseñanza. Se ha tomado como población a los 24 docentes de la tecnología, de los cuales 12 desarrollan materias que están directamente relacionadas en el uso de las TIC, siendo así involucrados en este estudio y por lo tanto representan la muestra. Se recopiló información de los docentes, jefe de programa de la tecnología, grumetes, Departamento de Estadística y Departamento de Telemática. Los resultados muestran a los docentes con buenos niveles de formación en TIC, con una percepción favorable en su uso. Se observa una tendencia a su actualización permanente; sin embargo, existen algunos casos puntuales que demuestran lo contrario. Se recomienda continuar con el seguimiento a estos procesos aplicándolos en las otras tecnologías y escuelas de formación de la Armada Nacional.

Palabras clave: E-learning, grumete, TIC, West point.

Introduction

The NONS[1] is located in the city of Barranquilla. It is near the Caribbean Sea and behind its facilities is Colombia's most important waterway: The Magdalena River, which flows into the Caribbean Sea through the Bocas de Ceniza. This institution trains and prepares both militarily and technologically the men and women who serve as non-commissioned naval officers in the naval or land units of the National Navy.

Nowadays, there is no previous study on the use of ICT in the teaching process of Electromechanical technology nor the impact they have on it. For this reason, it is necessary to know how to use and incorporate them. We have the continuous collaboration of teachers (this research's object of study) and the academic program directors. Both are needed for preparing talented people in the use of new information and communication technologies. In addition, there is a need for people characterized by their enthusiasm, willingness, motivation and interest in promoting innovations so that can cabin boys benefit from the instruction received. This led to the following question: What is the status for the use of ICT in the in NONS's Electromechanical technology teaching process?

When trying to answer this question, an analysis was initially carried out on the ICT state of the art at the global, national and regional levels. As a result of this study, we discovered that by using them in the pedagogical activity, the teacher's work in higher education institutions is made easier due to the student's motivation to research a previously discussed topic from class or to prepare the lessons to be received in advance. This helps in structuring meaningful learning.

Pedagogical processes benefit from the management of technological resources, from class preparation to didactic evaluations. These are supported by software specifically designed for this purpose. This enables the implementation of training with quality standards where the student manages to achieve meaningful learning in accordance with the current demands of society. Citizens, therefore, have characteristics for knowing, doing and acting, with innovative skills that they recognize in their environment, adapting to it and seeking to solve situations that come their way on a daily basis. As a result, they are able to create new products that meet human needs (Unesco, 2008).

[1] Non-Commissioned Officer Naval School

The structure we work with in Spain is based on a quality education focused on the student, i.e., with up-to-date information received in a way that effectively addresses current challenges. On the other hand, the teacher is constantly preparing the topics discussed in the classroom and updating their knowledge through courses or masters, which not only include research in their field of knowledge but also in ICT. In other words, the technological means in training are handled with prudence; and through their use, they provide truthful and precise knowledge (European Commission, 2018).

Nowadays, ICT have reached a peak and experienced a great boost thanks to their impact on the different social communities. So much so that they are used in every activity of the human being, promoting a rise in the demand of worker training, which in this case corresponds to teachers and students (Marqués-Graells, 2012). Indeed, there exists a requirement for a digital literacy that provides the proper training needed to access information and communication anytime and anywhere, thus, leaving time and space barriers behind.

The impact of ICT is evinced by the society and development model that humanity has passed through (Fourçans, 2013). It is manifested in the teaching process, since they 'enable the integration of more novel experiences that are connected to the expectations and experiences of XXI century students' (Unesco, 2013, pg. 67).

Educational programs that catch the students' attention due to their user friendliness and dynamic structure provide a way of improving the teaching process, enabling teachers to have a versatile tool available to be used when developing lessons according to the topic being addressed and the development point of the pedagogical activity. In addition, 'animations provide further simplicity in the design - and, subsequently, in the cognitive load; they are superior to static media in terms of learning efficiency' (Holzinger, Kickmeier, & Albert, 2008, pg. 287).

Having the information at hand, sorted by analysis necessities with assessment models and tools that are efficient and pertinent to the conditions for developing academic actions, means that the provided training can prove to enable improvement proposals for both teachers and students (Jaime & Lizcano, 2015). Mobile learning is based on information reception and delivery in different contexts with the aid of technology, adding a channel to support the other real-time training resources (Ramos, Herrera, & Ramírez, 2010).

The benefits of virtual learning, such as the optionality of the student's presence in the classroom (Pantoja-Vallejo & Zwierewicz, 2008), and the fact that the use of ICT means that the advantage level can be measured by social prestige, coexistence and user satisfaction (Opati, 2013), provide those students with access to technologies and their respective tools with an interactive learning developed within a dynamic environment (Imbernón, Silva, & Guzmán, 2011).

There are difficulties present in educational institutions because 'in schools, changing lesson planning is slower than adapting to computers in the classroom' (Livingstone, 2012, pg. 10). However, research by the ITU[2] reflects the current ICT global infrastructure progress state considering the indicators proposed by them (ITU, 2017).

Some of the institutions and organizations highlighted their support to the use of ICT are the United Nations Task Force during the forum on Promoting an Enabling

[2] International Telecommunication Union

Environment for Digital Development, held in Berlin in 2004, which communicates the key role of ICTs within organizations. The WHO (World Health Organization) also promotes their implementation in the field of health sciences, as well as the WIPO (World Intellectual Property Organization), which promotes those activities related to e-commerce on the Internet in order to streamline commercial transactions.

In addition, the ICAO (International Civil Aviation Organization) has designed a plan to ensure compatibility between its applications and aviation security components worldwide. The FAO (Food and Agriculture Organization of the United Nations) also carries out projects aimed at converging new and traditional technologies in order to work on alternative crops. Similarly, the UNCTAD (United Nations Conference on Trade and Development) collaborates with developing countries in implementing national ICT policies to promote online-business, exports and competitiveness.

Meanwhile, the International Trade Centre (*Centro de Comercio Internacional*) administers the e-trade bridge program in 30 countries managing auctions of different items via the Internet. Similarly, the WMO (World Meteorological Organization) is working on the development of an ICT system for the exchange of information regarding weather conditions, water resources and climate types.

The World Bank supports governments in implementing competition policies and regulation for the ICT sector. In addition to the above, the OECD (Organization for Economic Cooperation and Development) reviews the efforts of member countries from this community to strengthen access to information.

CERN (European Organization for Nuclear Research) manages the ICT project with the collection and exchange of scientific data in the management of nuclear energy. Lastly, UNESCO and ITU, at the World Summit on the Information Society in Geneva 2003 and then in Tunis 2005, seek the integral development of the individual, with the development of ICT skills being one of their priorities through the Ceibal plan created in 2007 which aims to give equal opportunities to everyone through access to technology.

In military education, e-learning and simulation technologies provide solid tools for the preparation of military members, without forgetting that "achieving the development of competencies for the handling of information in virtual learning environments, the guidance of the teachers and the peers themselves is of great importance" (Alba & Orrego, 2013, pg. 114). The U.S. Army, through West Point, is the main driving force behind the development, use of e-learning and simulation technologies, investing billions of dollars in these programs.

Major investments in new educational technologies have enabled American cadets to remain motivated in studying in ways not done before. For this, behaviorist approaches are used with better control and management of the knowledge imparted to the subjects (Juhary, 2010).

The U.S. regiment built its twelve principles of knowledge management including policies ranging from the incentivized incorporation of knowledge with media such as podcasts, videos and simulations, to mandatory training (Byrne & Bannister, 2013). The military operations of networks, information technology and ICT are intertwined at the micro and macro organizational levels of the armed forces, emphasizing that the processes of use of force, support and generation of results are focused on their systems (Mattila & Parkinson, 2017).

The motivation to carry out academic activities in Latin societies stands out along with the student's concentration when immersed in a world where ICT are used, due to the animated dynamic and interactive possibilities of these tools. (Sunkel, 2010) This means that the way in which information is presented to cabin boys influences their learning disposition. In Colombia, five skills were specified for teachers to properly manage ICT: technological, communicative, pedagogical, managerial and research (MEN, 2013), with full knowledge in technological tools, from their functioning, validity and regulations perspective.

The reason for its use, and the way it will be implemented in the classroom, must be clear. This is to say, there must be prior planning that includes the communication method to be used for these processes to enable new knowledge to be integrated into the student's previous experience. The teaching function in NONS is therefore framed within a continuous and integral pedagogical formative process, which sizes the management of disciplinary, interdisciplinary and transdisciplinary knowledge through ICT and other means that enable the student's social and academic transformation (ENSB, 2016).

NONS professors have been working in modeling by using algorithms that enable naval objects, machines and tools to be visualized, facilitating the instructions given to the cabin boys in the machinery and equipment parts used in the Colombian Navy (Álvarez, 2014). AR[3] provides the details in handling plans, ships and airplane analysis, enabling the cabin boys to become more involved in their preparation, and therefore, receive significant learning foundations which, in this situation, are hard to achieve without the technology's help.

Method

The proposed objective of this research is performing an ICT diagnosis for the use of the teaching process in the NONS's Electromechanical technology.

Participants

The population is made up of 24 NONS Electromechanical technology teachers with different undergraduate and postgraduate academic training. They are also composed of 2 completely differentiated groups: 14 civilian teachers with extensive experience in secondary and higher education formative fields, knowledgeable in different pedagogical strategies to impact the cabin boys' learning; and 10 military personnel (some of them working in Electromechanical Technology and others on support belonging to another technology) with specific knowledge and skills in a work area, and knowledgeable in the diverse needs presented in the different naval and terrestrial units of the Colombian National Navy.

Of these 24 teachers, there are 12 (50% of the study population) whose subjects are directly related to the use of those ICT involved in this study. We also work with the Electromechanical Technology program chiefs, who themselves are two non-commissioned officers with extensive experience and knowledge in the strengths and needs of the Colombian National Navy, first and second year cabin boys with emphasis on Motors, Electrical Controls and Refrigeration who are in permanent contact with

[3] Augmented Reality

teachers, the Head of the Statistics Department who is responsible for handling the notes, the Head of the Telematics Department who is in charge of the institution's hardware and software structure, the librarians who handle information regarding texts, magazines, platform and databases, the Head of the Instructional Assistance Department, other non-commissioned officers who directly or indirectly relate to this technology, and the Academic Dean.

Design

The research method used is quantitative, which relies on deductive statistical tools. This approach presents several useful sequential characteristics applicable to the field of research with which a problem of delimited and concrete study is set out by carrying out specific questions with the proposal of the hypotheses from the researcher's part: the use of ICT improves the teaching process in NONS Electromechanical technology; when ICT tools are available in NONS Electromechanical technology, some of the teacher's academic activities are facilitated, with the incorporation of ICT in NONS Electromechanical technology favoring the teacher's collaborative work. The answers are obtained with their respective demonstration and inferences to other teachers in technology and the institution from a selected sample of the population.

We seek maximum control in order to exclude other possible explanations based on uncertainty and to minimize the error generated during the process. The predictions proposed are based on previous studies and it is clear that the phenomena observed should not be subjective and, therefore, follow a determined and structured pattern.

Data collected are within the standards of validity and reliability required in scientific research work, using deductive reasoning from educational theories, ICT principles and military training requirements that are transformed into hypotheses for subsequent testing (Hernández, Fernández, & Baptista, 2010). The aim is to identify the causal laws present in ICT teaching in NONS Electromechanical Technology, which is shown as a reality external to the individual.

Instruments and Techniques

The survey used is reliable, which means that, when it is applied to the same individual under the same conditions, it generates the same results. In addition, we compile the information handled by the Statistics Department with respect to the evaluations carried out by the cabin boys about the teachers on the subjects taught, the program chiefs who carry out the annual performance evaluation, and the Telematics Department, in whose formats the hardware and software infrastructure of the institution is recorded.

The teacher's preparatory conditions were measured with respect to ICT and the way they perceive them in their academic activities thanks to the survey. The survey was developed in stages from 2013 in the Electronics program and modified and adapted in 2016 to Electromechanical Technology and evaluated by an interdisciplinary group of experts in 2017. Subsequently, thanks to the information provided by the Statistics Department, data was obtained on the assessment periods that the cabin boys carry out on the teachers according to the subjects that they teach, for which a representative sample was taken, and where they were asked to respond to a questionnaire designed for this purpose.

With the annual performance evaluation that the program managers carry out on the teachers, information was obtained referring to the strengths, the aspects to be

improved, achieving the objectives, and overall performance. Lastly, the documents provided by the Telematics Department obtained data on network capacity, computer equipment and the technological tools that teachers have access to, as well as any installed software and databases.

Procedure

The information used for this research was collected through an action defined by stages: firstly, the questionnaire was developed with closed-ended questions aimed at understanding the teachers' training in ICT. Secondly, it was used Likert type questions in order to identify their perception regarding the handling of these technologies. A sample of 12 of the 24 teachers in Electromechanical Technology was subsequently selected according to the subjects taught and the level of involvement in the use of ICT, providing them with a discussion on the importance of their work. The survey, designed in Google Forms, was then delivered to their emails.

A meeting was later held with the non-commissioned officer in charge of data management in the Statistics Department, who consulted its sources and provided all teachers with information on the assessment carried out by the cabin boys. The researcher selected the relevant information from the Electromechanical Technology for further analysis. A meeting was consequently arranged with the program managers to provide the annual performance evaluation data to the technology teachers who provided the information used in this work.

Based on the foregoing, the Head of the Telematics Department compiled information on the databases, hardware and software installed in the institution. Lastly, the collected information was processed, enabling identifying the dependency relationships among variables. So, this led to the verification of the proposed research hypotheses.

Results

The following is an analysis of the results obtained during the research established in the NONS.

The following factors are considered in Table 1 which corresponds to the teachers' evaluation of Electromechanical Technology for the first module for 2017 by the cabin boys: *Knowledge of the discipline, planning of the workshop, learning environment, strategies, methods and skills, motivation, assessment, communication, course management, information and communication technologies, general satisfaction*. We can see that the minimum score achieved over 5.0 was 4.5 in the Damage Control and Thermal Engine subjects and the maximum was 4.9 in the following subjects: Converters, Alternative Engines, and Automation and Principles. Such results indicate that the cabin boys considered that a high level was maintained during the instruction given to them in this module's subjects probably due to the fact that they most likely enjoyed the way in which the academic activities were carried out.

Table 1.
Teacher Evaluation 2017 (1).

No.	Subject	Evaluation
1	Engine Thermodynamics	4.6
2	Converters	4.9
3	Naval History	4.7
4	Alternate Engines	4.9
5	Damage Control	4.5
6	Current Circuit	4.8
7	Automation and Principles	4.9
8	Thermal Engines	4.5
9	Basics of Thermal Engines	4.7

Note: created by the work's author based on the information provided by the NONS Statistics Department (2017).

In Table 2, corresponding to the teachers' evaluation of the Electromechanical Technology of the second module for 2017 by the cabin boys, we can see that the minimum grade achieved over 5.0 was 4.1 in the Design I (AutoCAD) subject and the maximum was 4.7 in the following subjects: Human Rights, Thermal Engines, Electromechanical Engines, and Automation and Principles. This indicates that the cabin boys considered that a high level was maintained during the instruction given to them in this module's subjects probably due to the fact that they enjoyed the way in which the academic activities were carried out.

Table 2
Teacher Evaluation 2017 (2)

No.	Subject	Evaluation
1	Fluid Mechanics	4.4
2	Human Rights	4.7
3	Thermal Engines	4.7
4	Research Methodology	4.5
5	Damage Control	4.6
6	Electromechanical Engines	4.7
7	General Technical English	4.6
8	English III	4.5
9	Automation and Principles	4.7
10	Alternating Current Circuits	4.3
11	Drawing I (AutoCAD)	4.1
12	Ethics and Values	4.6

Note: created by the work's author based on the information provided by the NONS Statistics Department (2017).

The program manager is in charge of assessing the teacher's job performance as related to the Electromechanical program by carrying out this activity during the mid-year and at year's end through the productivity and work pattern factors, which are in turn divided, in the case of productivity, into: *planning, resource use, quality, technical competence, responsibility and opportunity;* in the case of work pattern, it is divided

into: *institutional commitment, information processing, teamwork, interpersonal relations and initiative*.

The objectives between the program manager and the teachers are concerted annually in accordance to the institutional needs, to be worked during the evaluation period. The results show that the teachers obtain between *superior*, 767 up to 883, and *outstanding*, 884 up to 1,000, which indicates their high level of commitment and responsibility with both the institution and the program.

Information was obtained from the Telematics Department regarding the institution's physical resources. There are 20 desktop computers in the English laboratory; 10 desktop computers in the electrical controls laboratory; 1 desktop computer for every 3 teachers in the faculty office; 27 desktop computers in the library; a room with 11 laptops in the PVD[4], 1 Smart TV, and another room with 16 desktop computers, 1 Smart TV; there is also 1 TV for every 2 classrooms.

All of the above equipment has broadband internet access. However, some of them have more restrictions when browsing websites such as those in the faculty office and the English laboratory. There are also places where the use of equipment is shared between the students and the teachers, such as the English laboratories, the electrical control room, the PVD, and the library.

With regard to software, Blackboard[5] is used for all Military Forces of Colombia, which has access to the Digital National Security Archive documentary databases (a collection of more than 140,000 books from different international publishers). The reference for the management of thesis and articles from Latin American universities is also available.

Moreover, the Colombian National System of Open Access to Knowledge (SNAAC, *Sistema Nacional de Acceso Abierto al Conocimiento*) is used and which coordinates information between public and private institutions in Colombia. In addition, the FFMM library catalogue is available along with the ARC library with access to Training Schools.

During their training, marines have at their disposal the ESUP library when enrolling in the ARC Surface School. The ESCAN library is also consulted in the air-sea area, which provides access to naval aviation along with the FAC library when admitted to the Colombian Air Force Training Schools.

The SIBFA catalogue is used for the consultation of physical documents in the libraries of the Armed Forces. Moreover, we work with the online magazine database ProQuest and Power Search; the latter being a tool for locating articles and books on topics such as justice, crime, war and terrorism.

In addition to the above, the Latin American scientific journals SciELO and the Directory of Open Access Journals DOAJ (website for the access to free journals) were consulted for journals. Lastly, with respect to databases we have the GALE CENGAGE Learning, the Chatham House Online Archive database, the Smithsonian Collections Online database, the OECDiLibrary (database for Economic Cooperation and Development), and the database of the Organization of Ibero-American States (OEI,

[4] Punto Vive Digital

[5] Computer platform for the creation of documents and administrating courses which are accessed by the students via the internet

Organizaciones de Estados Iberoamericanos). Some of these sources of information are limited to the exclusive use of military teachers.

With regard to the installed capacity of the cabling, Figure 1 shows the infrastructure of the Academic Department, classrooms and library.

Figure 1. Wiring in the Academic Department.

Note: Adapted from the NONS Telematic Department 2018.

Apart from what has been previously explained, Figure 2 shows how the different dependencies of the NONS are connected via single mode, multi-mode and UTP.

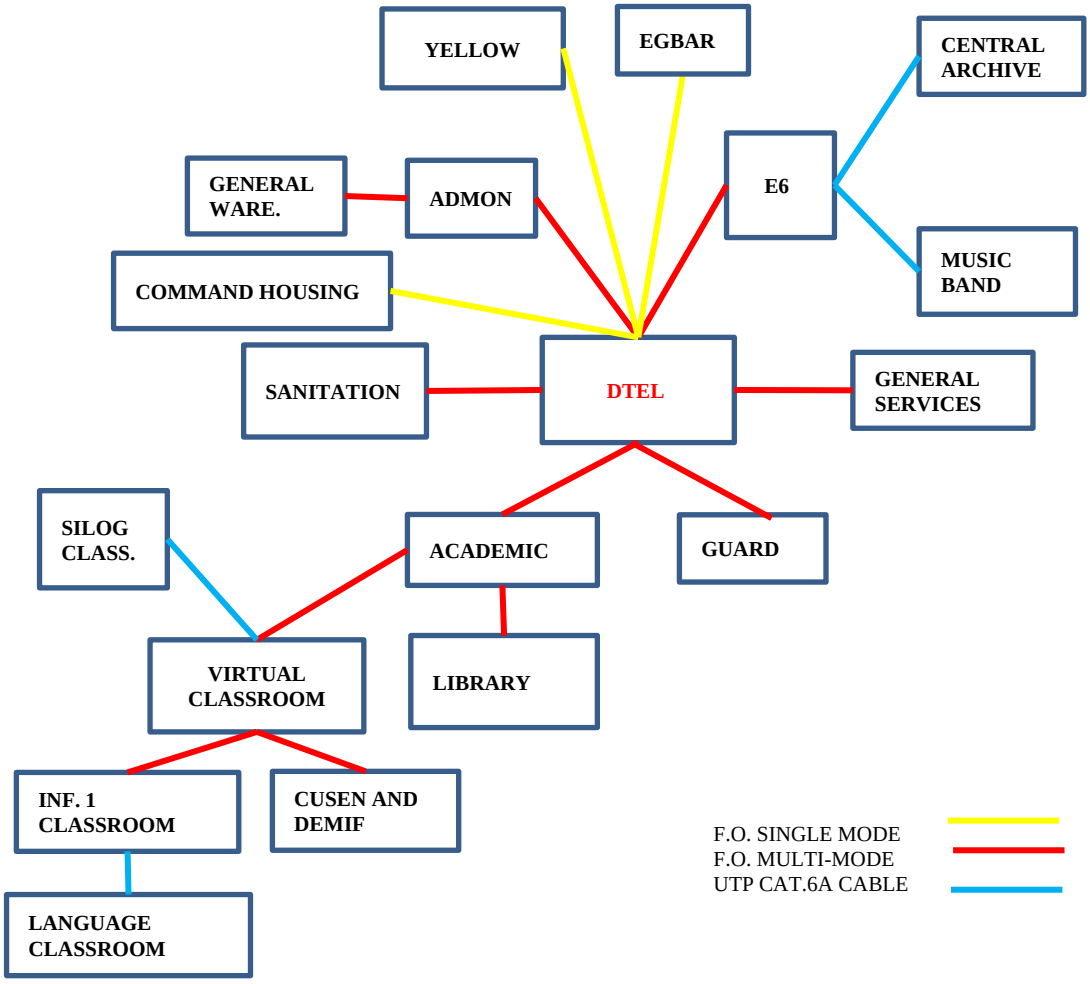

Figure 1. Wiring in the NONS.

Note: Adapted from the NONS Telematic Department 2018.

Discussion and Conclusion

With the use of ICT, NONS teachers develop their academic activities much better planned, initially investing time to prepare the support materials but becoming easier in later implementing them in the subsequent modules with these tools, and so streamlining the educational process. This is to the benefit of cabin boys who receive instruction directly applied to electromechanical systems, visualizing situations where they see the importance of knowledge. The teacher can also devote more time to resolving student concerns or consulting updated information on a specific topic.

In addition, there are obvious difficulties during the research, keeping in mind that, as a military institution, there are restrictions on the handling of information that needs to be requested under justified grounds and with anticipation in order for them to carry out the respective analysis and authorize its disclosure. It is also necessary to consider the priority status in Colombia that lead to joint efforts in improving national security; thus, more time is needed to carry out subsequent work related to ICT, providing increasingly comprehensive responses with their respective recommendations. Economic resource constraints and the non-priority of its implementation likewise affect the broadening of this technology.

In a previous study carried out in IHE[6] in Colombia, the difficulties that arise when implementing these technologies were:

> The oldest teachers...are...restrictive in their use of technological mediations, rejecting and disagreeing with processes that take them away from the traditional paradigm.
>
> ... One aspect to be overcome is the loneliness and absence of people not present during the learning process...
>
> Technological mediations... Are associated with the need for a fast and stable Internet connection (Padilla, Vega, & Diego, 2014, pgs. 286-287).

The aim of this research was to attract the attention of teachers and researchers, motivating them to use computer resources more frequently, implementing them in their work functions according to the training needs of the cabin boys with applications that strengthen their learning. Its purpose is for non-commissioned officers to provide their services in the different regions of the country, in order to achieve a strengthened and strong Colombian National Navy.

One of the objectives was to confirm that collaborative work among teachers is strengthened with the use of ICT, as evidenced by their perception of the benefits of sharing information, programs and other computer tools. Furthermore, in some cases they come into contact via Wi-Fi, through WhatsApp and e-mails when carrying out teamwork such as reviewing the PEI, academic regulations, collecting and analyzing information regarding the report to be sent to the CNA[7] on how the Naval School is doing, or when they need to communicate with the program chief.

Another objective was to identify academic activities that are simplified by the use of ICT. This manifests itself with the benefits of facilitating class preparations with information found through specialized web pages, databases, developing classes using videos, power point or prezi presentations, specialized programs such as Derive, Circuit maker, Solid Works, Solid Cam, Geo gebra, sending data online, evaluations through the Blackboard platform, and feedback on recommendations that can be carried out online.

Lastly, to identify the influence of ICT in teaching, where it was evident that some teachers do not have solid ICT training, and simply handle them by experience or by listening to others; this situation was observed when they were required to help in completing the survey, although they did show interest in improving and resolving this difficulty after speaking with them. There are teachers who can be considered as being at an intermediate stage in the implementation of ICT because they handle the basic Microsoft office package and their academic activities revolve around this resource. Other teachers are at a more advanced level, using specialized software for their courses in Mathematics and Electronic Circuits.

This shows that teachers need better preparation in NONS to take greater advantage of ICT. This stimulates the cabin boy in researching a content and even preparing a topic in advance to be discussed in class. This situation is observed in the classroom and in the library when they consult specialized web pages, where they ask the teacher where to find the information, what web pages they know of, what online

[6] Institutions of Higher Education
[7] National Accreditation Board (*Concejo Nacional de Acreditación*)

texts they know of, motivating the teacher to research and update their knowledge, and so becoming a counselor who knows the information and knows where to find it.

The teacher's role in the management of ICT during their daily activities stands out, reflecting positively in their degree of interest, commitment and support when using these tools. In short, cabin boys are encouraged to apply them in their assigned academic commitments, providing guidelines to follow so that they develop quality work both in their content and in their presentation, as well as being regarded as references for other students who begin their work. This is evident in the work performance evaluations carried out by the Head of the Electromechanical Technology program.

With respect to the way in which the teachers are perceived by the cabin boys, the evaluations carried out highlighted the perception that their teachers are committed to the teaching processes. They follow a sequence on the imparted instructions, clarify doubts and encourage their students in improving their academic performance, encouraging them to consult reliable sources and use ICT in a legal and ethical manner during the analysis and development of their work.

Regarding the ICT infrastructure of NONS, hardware resources were found such as computer equipment with Internet connection in the Electromechanical Technology laboratories, the library, the Punto Vive Digital, the faculty office where educators have access to prepare as well as to develop and evaluate their classes, as well as in the cabin boy shop where documents can me printed, scanned and information consulted, without forgetting the computers of the research center's program managers. The software found were those such as office packages, specialized software, and databases that teachers consult or manage to share information even with other forces in Colombia, along with the Blackboard platform used to communicate with the cabin boys via messages, assigning activities, and evaluating them.

Adding to the list are Smart TVs installed for every two classrooms, used by teachers as well as the cabin boys for videos and presentations. Likewise, most of the cabin boys also have a laptop computer where they carry out many of the activities assigned to them by the teachers.

Although there are online training courses in the use of the Blackboard platform as provided by the Colombian National Navy, the teaching process may be improved with the addition of the system's effective use, since not all teachers currently us it. The use of a greater number of interactive software aimed at handling machines, technology mechanisms, electronic circuits, and refrigeration is also recommended. This drives the consultation of specialized sources such as databases and works on thesis works done by other cabin boys who previously carried out their research, by which they can count with a better vision and propose written solutions either as mock ups or prototypes for specific institutional cases.

We may infer that the Naval School tends to improve its academic processes as enshrined in its institutional accreditation by the CNA with the certification issued by its ICONTEC[8] audit for all its administrative processes. This highlights certain aspects to be improved such as applied and scientific technological research, but it also shows the high quality with the resolutions in recognizing the effectiveness of their academic programs, its organization, functioning and the compliance of its social function. The teachers committed to their activities and conscious of what dominates in the

[8] Colombian Institute of Technical Standards (*Instituto Colombiano de Normas Técnicas*)

application of ICT in education at the global level propose driving its rational and efficient management so as to increase their research level in NONS's Electromechanical Technology.

The recommendations also include the development of other exploratory activities that involve the rest of the NONS's technologies, not only at the cabin boy's levels, but the marines' intermediate capacities. Non-commissioned officers with advanced training can also be included, developed technological specializations from the graduate studies office such as Network Systems, Composite Materials, Integrated Coastal Zone Management, in Maritime Traffic Control, Health Services Administration, in Human Talent Management and Leadership, Security and Information Management. This point suggests considering this place of practice during the proposed studies, specifically for Hydrography and physical Oceanography where the cabin boys carry out part of their APNS[9] studies.

In addition to what has been previously mentioned, future research can analyze the learning processes, how to benefit from the use of these tools, speaking with the cabin boys to obtain clarity on administering these computer resources, with an emphasis on the development and management of specific software as required in each technology, since there are currently few of them. The need also arises to implement research in the naval officer training centers, beginning with the APNS cadets and students from NITS[10] in their different levels of education in this field, keeping in mind that there are restrictions in the management of information due to its military nature and, thus, a greater amount of time is needed to justify such requests with the support of previously carried out studies.

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