



Information and Communication Technologies based on formative research

Las tecnologías de la información y la comunicación en función de la investigación formativa

Amarilis Rita Pérez Licea*, Irene Trelles Rodríguez**, Caridad Aurora Lora Quesada***, Jorge Luis Olmo Pérez****, Luisa Noa Silveiro*****

Received: February 16, 2019.

Accepted: December 17, 2019.

Cite this:

Pérez, A. et al. (2020). Information and Communication Technologies based on formative research. *Espirales. Revista multidisciplinaria de investigación científica*, 4(33), 55-68.

* Second Degree Specialist in Human Anatomy. Coordinator of Basic Sciences Area, Universidad Católica Santiago de Guayaquil, Guayaquil, Ecuador.
E-mail: amapeli55@gmail.com
ORCID: 0000-0001-7841-6573

Google Scholar

** PhD in Communication Sciences. Director of the Doctorate Department, Universidad Católica Santiago de Guayaquil, Guayaquil, Ecuador.
E-mail: irene.trelles@gmail.com
ORCID: 0000-0001-5370-7155

Google Scholar

*** Master in Medical Education, Master in Community Health. Auxiliary Professor, Universidad de Ciencias Médicas de Holguín, Holguín, Cuba.
E-mail: calor@infomed.sld.cu
ORCID: 0000-0002-1010-8993

Google Scholar

**** Industrial Engineer, Electronics and Systems Technologist. Instituto Tecnológico OLVITECH, Guayaquil, Ecuador.
E-mail: olmojwpersonal@gmail.com
ORCID: 0000-0002-3184-0585

Google Scholar

***** PhD in Communication Sciences. Full Professor, Universidad de La Habana, La Habana, Cuba.
E-mail: luisanoa38@gmail.com
ORCID: 0000-0003-2504-3325

Google Scholar

Abstract

Information and communication technologies based on formative research are of great importance for achieve competent professionals in the labor and research sphere and in the adequate preparation of teachers with the consequent accompaniment to students with effective tutorial processes during their academic training en Nursing. An observational, descriptive study was carried out between August 2018 and August 2019, in which a population of 704 students was worked; a semi-structured questionnaire was prepared and a group interview was applied to 32 Nursing professors at the Universidad Católica de Santiago de Guayaquil, who taught their subjects in the different Units of Basic Curricular Organization (Basic, Pre-professional and Degree). It was found that the motivation for the realization of scientific works by the professors still found in the initial state (67.24 %); the 26.55 % of the students respond that there is a lack of systematic planning of actions and strategies in terms of linking research in the context of pre-professional practice and acquired skills, and construction of the research projects; and only 22 % manifest it is useful to be able to select and prepare their information, which demonstrates that the existing methodology in the program has yet to be adjusted for such effects.

Key words: formative research, students, teachers, nursing, curriculum organization unit, degree.

Resumen

Las tecnologías de la información y la comunicación en función de la investigación formativa son de gran importancia para lograr profesionales competentes en la esfera laboral e investigativa y en la adecuada preparación de los docentes con el consecuente acompañamiento a los estudiantes con procesos tutoriales efectivos durante su formación académica en enfermería. Se realizó un estudio observacional, descriptivo, entre agosto de 2018 y agosto de 2019, donde se trabajó con una población de 704 estudiantes; se elaboró un cuestionario semiestructurado y se aplicó una entrevista grupal a 32 docentes de enfermería de la Universidad Católica de Santiago de Guayaquil, quienes impartían sus asignaturas en las diferentes Unidades de Organización Curricular (básica, preprofesional y de titulación). Se encontró que la motivación para la realización de trabajos científicos por parte de los profesores aún se encuentra en estado inicial (67,24 %); el 26,55 % de los estudiantes responde que existe falta de sistematicidad en la planificación de acciones y estrategias en función de vincular la investigación en los contextos de la práctica preprofesional y habilidades adquiridas y construcción de proyectos de investigación; y solo un 22 % manifiesta que es útil poder seleccionar y preparar su información, lo que demuestra que todavía hay que ajustar más la metodología existente en la carrera para tales efectos.

Palabras clave: investigación formativa, estudiantes, docentes, enfermería, unidad de organización curricular, titulación.

Introduction

Research training by students and graduates of any university program is very important. There are numerous studies carried out in the last decade on this subject in different universities, which shows the concern of the university community for the professionals it trains, different are the Latin American universities that have developed different studies related to the subject that demonstrate the importance that research scientific training is being provided from undergraduate.

Research in the health sector, and especially in Nursing, plays its original role as a generator of knowledge, it has a dual academic role; on the one hand, it promotes the training of scientists and, on the other, it prepares professionals with solid scientific bases. The balanced assessment of these activities is an essential step to obtain a modern projection of human resources training in health.

Scientific research is considered the highest expression of the skill that the student must master in the framework of university educational processes (Álvarez de Zayas, 2006), the contemporary university is responsible for the generation and transfer of knowledge.

The student's training activity presents particular characteristics where the scientific research methodology allows the acquisition of knowledge, training and development of skills, research habits, attitudes and values that lead to finding the solution to problems with independence and creativity, through the use of the scientific method (Barbón & Bascó, 2016).

Nursing knowledge related to the care of the basic needs of the individual throughout life in a health and/or disease situation implies how to dispose of the phenomena that we encounter through research (Callizo & Carrasco, 2015).

Currently, universities are not aware of the changes in science and technology worldwide that lead to the systemic consolidation of the development and improvement of student scientific activity, in accordance with the scientific policies of each region, nowadays, it is necessary to increase scientific research at undergraduate level, to encourage an increasing number of students to motivate themselves towards research, which leads to increasing the quantity and quality of research, with transformative effects on the quality of the population and health services. However, despite its importance, recent analysis results support the existence of recognized limitations to effectively carry out this activity (Callizo & Carrasco, 2015; Fernández et al., 2008; Ruiz, González & Morán, 2015).

It is stated that the ultimate goal of any profession is to improve the practice of its members so that the services provided have the greatest efficiency, which seeks to increase their image and as such is dedicated to the constant acquisition of scientific knowledge that is fundamental to their practice, and today this is becoming more relevant due to the increasing cost of services, consumers are beginning to demand that professionals examine the effectiveness of their practice and specify the effect that their knowledge and skills have on society (Fernández et al., 2008).

Nursing considers that the solution of health problems is not only and exclusively the task of a discipline, but rather joint participation, through permanent scientific work whose result is the contribution of knowledge and appropriate technologies (Ruiz, González & Morán, 2015).

The quality of nursing care cannot improve until scientific responsibility becomes as integral to tradition as humanism is. Investigative responsibility is essential for the practicing professional in their various roles, both in managing patients and in managing resources and logistics in the health care system.

The application of the scientific method in the nursing care practice is the Nursing Care Process (Proceso de Atención de Enfermería –PAE– for its acronym in Spanish). This method allows nurses to provide care in a rational, logical and systematic way (Chalen, 2018), it constitutes the basic work tool for professional practice that allows not only to identify problems derived from the effect of the health-disease process, but also to plan, execute and evaluate the Nursing care provision, as a result of scientific research, provides the nurse with technical capacity (handling of instruments and clinical surgical equipment), intellectual capacity (issuing effective and scientifically based care plans and relationship skills), knowing how to look, empathy and obtaining the greatest number of data to assess. Therefore, it is important to emphasize that the quality of nursing care cannot improve until scientific responsibility becomes part of their daily actions.

In Latin America, with a particular effect in Ecuador, this situation is still not systematically maintained, which leads to a limiting factor, not only student research and the interest of future professionals (Chalen, 2018), but also the teaching performance in this area of pedagogical activity, on which the research results of the students and their motivation depend to a great extent.

Scientific research as a starting point takes the progressively growing information or knowledge accumulated by the research of previous scientists carries in it an exhaustive review of what will be investigated (Chalen, 2018).

In accordance with the legal framework, and to the Regulations of the Academic Regime, it has undergone modifications and total emphasis is placed on its Art. 39 where it is stated that formative research is a fundamental component of the academic training process and is developed in the student-teacher interaction, throughout the curriculum of a program; as a transversal axis of the transmission and production of knowledge in learning contexts; enabling the development of investigative skills by students, as well as the innovation of pedagogical practice of teachers. It is a process of use and generation of knowledge characterized by the application of conventional research methods, innovation, analysis and validation among peers; generally producing knowledge of relevance and local, national, and/or international validity, oriented to know-how professional; and incorporating technical-technological components in its products.

Therefore, Higher Education Institutions –HEIs– must plan, accompany and evaluate actions that ensure student training in and for research; research as a general learning strategy; and, action research of the curriculum, in its different components, by the academic staff as stated in the Academic Regime Regulations. The HEIs will determine the object, scope, rigor, impact, methodologies and conditions of development of the formative research in their programs and/or programs.

Thus, it is summarized in its Art. 40: Formative research at the third level. Formative research at the third level tends to the development of research knowledge and skills aimed at scientific, technological, social, humanistic and artistic innovation. Regarding technical-technological and undergraduate training, it will be developed through the mastery of exploratory investigative techniques in relation to the creation, adaptation and technological innovation, while artistic programs should incorporate research on technologies, models and artistic production activities. In relation to other professional fields, research for learning will be carried out in the training field of epistemology and the research methodology of a profession, through the development of exploratory and/or descriptive research activities or projects.

To consider that research methods are only relevant in the development of scientific research is wrong. On the contrary, as discussed below, research methods are also important for effective clinical practice in the context of modern nursing care.

In the last 50 years, scientific research in nursing has taken on an increasingly important role to support practice based on the use of models and theories of nursing in hospital and community professional practice; the PAE as a regulatory tool for practice, innovation and technology in professional practice, research for independent professional practice, reassessment of the professional's educator role and the use of educational activities aimed at so-called specific risk groups (diabetics, AIDS, hypertension, pregnancies, STIs, among others) where education, management and its conceptual framework as the foundation for professional development in the third millennium go hand in hand with scientific research; and it is for them that student scientific activity becomes increasingly essential from pre-professional training.

In the Nursing Program of the School of Medical Sciences of Universidad Católica de Santiago de Guayaquil, the Scientific Student Sessions are held every year, aimed at improving the formative research of students, with the guidance of their teachers and in the same way they are integrated graduates and present in this space the results of work carried out that reflects their daily work as necessary elements for the proper development of their professional activity and improvement of the quality of the current Ecuadorian university.

Within the Nursing program there are the subjects that are specifically taxed to the area of investigative training and all in general during the professional training process should be oriented to the knowledge of the processes of exploration, inquiry, organization, explanation, structuring, involvement and systematization of objects, study systems and professional performance.

Then, the educational objective for such purposes of each teacher will be to articulate the disciplinary contents and those of the profession based on logics, languages and research methods oriented to the understanding and argumentation of the objects and the context of the application of the profession, supported by information and communication technologies to move towards the construction of the transformation agenda for Ecuadorian higher education.

For this reason, it is important to describe the current state of development and promotion of student scientific activity in order to assess the existing limitations in such a sense that they lead to achieving the transformations to which higher medical education aspires.

In accordance with the above, the present study aims to describe the main results of the formative research and the current state of development and promotion of student scientific activity in the Nursing program at Universidad Católica de Santiago de Guayaquil.

According to the aforementioned, we would then like to describe the main diagnostic results of the development of student scientific activity in the Nursing program at the Universidad Católica de Santiago de Guayaquil.

Materials and Methods

Between August 2018 and August 2019, an observational, descriptive and cross-sectional study was carried out, in which it was worked with a population of 704 students of the Nursing program, who had completed internships or professional practices in the training area.

To collect, a semi-structured questionnaire was designed for teachers, research teachers, executive teachers, and researchers, and a group interview was applied to 32 professors of the Nursing program, who taught their subjects in the Basic Curricular Organization Units (cycles or semesters I, II, III, IV), Pre-professional (cycles or semesters V, VI, VII) and Degree (cycles or semesters VIII, IX) according to a new provision of the curricular redesign curriculum.

As can be seen in Table 1, it was distributed according to the Curricular Organization Unit as follows:

Table 1. Distribution of the surveyed students according to Curricular Organization Unit

Curricular Organization Unit	N (%)
Basic (I, II, III, IV)	342 (48)
Pre-professional (V, VI, VII)	292 (42)
Degree (VIII, IX)	70 (10)
Total	704 (100)

Source: author's own elaboration.

The semi-structured survey to collect data from the students was applied anonymously with 5 items and allowed obtaining information on the study variables such as: motivation and preparation of the subjects received to carry out scientific student work, criteria about planning of actions and strategies in order to link research in the contexts of pre-professional practice and skills acquired for autonomous and collaborative work, important criteria to consider within formative research in Nursing.

The interview guide explored three variables in an important way, these are: training received for the socialization and development of research in general and in particular student scientific activity, the execution and follow-up with an integrative nature of autonomous work with a view to carrying out work non-evaluative student scientists and the availability to carry out actions to achieve the participation of a greater number of students in the Student Days.

The instruments, both the student questionnaire and the group interview guide for teachers were validated through the expert method, which allowed their adjustment and improvement, based on their evaluation.

The data were tabulated and processed with the statistical package SPSS for Windows XP, descriptive statistics, frequency analysis and percentage calculation were used.

Results

As can be seen in Table 2, when exploring the current status of the survey applied if the students had received motivation from the professors of the program to carry out scientific work, responses were obtained from a majority (67.24 %) from those still in their initial state. Only 26.55 % of the students answered that they were progressively receiving specific instruction from their teachers, with statistical significance ($p < 0.05$).

Table 2. Current state of motivation of the surveyed students according to the participation and performance of scientific work

Advanced: A		Optimum: O		Progressive: P		Initial: I	
Quantity	%	Quantity	%	Quantity	%	Quantity	%
25	3.59	18	2.62	187	26.55	474	67.24

Source: author's own elaboration.

As reflected in Table 3, when addressing the preparation received by the subjects taught for the performance of scientific student work through their undergraduate training, encouraging responses were obtained with a predominance of 49.28 % in the students; in contrast, to the opinions of the students who in their answers say it is still low (23.87 %).

Table 3. Preparation received by the subjects taught to carry out student scientific work

Average		High		Low	
Quantity	%	Quantity	%	Quantity	%
347	49.28	189	26.85	168	23.87

Source: author's own elaboration.

The logic of the conception of the subjects is assumed from the consideration of the dialectical relationship between the methodological procedures for the development of scientific research and the content of the profession necessary for its development. From here it is taken into account: Research Methodology, Epidemiology, Biostatistics among others; in addition, to indispensable subjects in the degree unit and the last semester that the students are taking which promote and facilitate tools for investigative work; although it does not yet exist a total unfolding in these.

Regarding the criteria the planning of actions and strategies in order to link the research in the contexts of pre-professional practice and acquired skills, students still show difficulties when it comes to addressing their degree work, in construction of the research projects; and only 22 % manifest it is useful when it comes to selecting and preparing their information, which shows that the existing methodology in the program still needs to be adjusted more for such effects, with statistical significance ($p < 0.05$) (Table 4).

Table 4. Criteria for planning actions and strategies to link research in the contexts of pre-professional practice and acquired skills

Inadequate: I		Low: B		Medium: M		High: A	
Quantity	%	Quantity	%	Quantity	%	Quantity	%
339	49	122	17	171	22	72	12

Source: author's own elaboration.

When analyzing the information obtained from the group interview, it is possible to observe the following aspects: regarding the training received to develop research in general and in particular the scientific student activity, a total of 32 teachers them state that they have received such training (Table 5).

Table 5. Criteria of the different teachers of the Curricular Organization Unit according to the cycles or semesters

Teachers according to Curricular Organization Unit	Training received to develop research in general and in particular student scientific activity. N (%)	Follow-up with integrative character to the autonomous work with a view to the realization of student scientific works. N (%)	Availability of actions to achieve the participation of a greater number of students in the Student Conferences. N (%)
Basic (I, II, III, IV)	16 (50)	25 (75)	20 (70)
Pre-professional (V,VI,VII)	16 (50)	7 (25)	12 (30)
Degree (VIII, IX)			
Total	32 (100)	32 (100)	32 (100)

Source: author's own elaboration.

The follow-up with an integrative nature to the autonomous work with a view to the realization of student scientific work becomes insufficient in the Pre-professional and Degree. However, when analyzing comprehensively, only 75 % of teachers in the area of basic sciences are involved in actions to direct autonomous work in actions that follow student scientific work and we observe that there are still teachers who do not join these practices, despite the fact that they are in favor of the availability of actions to achieve the participation of a greater number of students in the Student Days is not fully integrated into these activities.

In general, we can summarize that the variables described in this study behave insufficiently, particularly for teachers of the Basic Curriculum Organization Unit where students begin to perceive the usefulness of the preparation they have received for link the knowledge and skills acquired with research throughout your program formation.

Discussion

To assess the results obtained, we took as starting point indicators that gave us the general idea about the participation of students, teachers or tutors.

The lack of consistency in the approach of the stages related to the process of formation of investigative skills as a practice with the student is notorious, very important in the state of student motivation, but where overload of hours of classes also plays an important role in teachers and students; in this regard Fernández et al. (2008) state that the role of the teacher is vital in the process of scientific research with accurate guidance that ranges from the formation of non-improvised scientific student groups with their previously motivated topic, the advice until the presentation of the results and the final report of their work. The authors of this work consider that, according to the results obtained, they agree with those mentioned and may also be affected by not following the methodology aimed at their presentation due to lack of teaching work in the research sphere.

The authors of the topic in question coincide with the criteria regarding the importance of teacher intervention for the actions of students in search of improvement in learning based on theoretical references, which allow to base pre-professional practice correctly through analysis judgments with the consequent selection of possible guidelines to advance and produce a change before, during and after undergraduate training (Pérez, Trelles & González, 2018).

It is important to point out that poor preparation in research methodology limits students to take on the research process, as stated by Araujo et al. (2013) in research carried out with psychology students, in which a limited command of theoretical-methodological knowledge to adequately carry out the research work as well as a lack of motivation towards research, a situation also applicable to this study, so the methodology to stimulate student scientific activity in our context must maintain implicit workshops that contribute to the development of investigative skills to increase participation in these activities.

The authors of this work agree that student scientific activity should be addressed as an important starting point for increasing scientific knowledge in the application of what has

already been acquired, which benefits pre-professional training and the development of habits, skills and abilities of the student (Herrera et al., 2012).

The implementation of the student scientific activity must be systematic since it has inextricable links with autonomous work, experimentation and pre-professional practice as an effective way to develop cognitive activity that leads to the independence and creativity of students in training, together in addition to the problem teaching through which the research process is oriented under the guidance of the teacher in question, authors' criteria have described it in such a way that in the settings of the particular disciplines it is necessary and consistent in our study (Canto, Cabrera & Franco, 2014).

Therefore, the multifactorial implication to guarantee the influence of the pedagogical work on the students is evident, where the training received to develop the research in general of the teachers, the follow-up with an integrative nature to the autonomous work and the availability of actions play an important role to achieve the participation of a greater number of students following a methodology scientific activity through the sequence of actions necessary to be developed by the school and its application to include its students in the Student Scientific Conference, as one of the strategies to increase the motivation and consolidation of the contents.

Conservative and traditionalist elements are still maintained within teaching despite the constant attempts to achieve effective learning by linking daily practice to the solidity of knowledge, insufficient development of habits, skills and values in professional training still coexist in the context of the current University in the XXI century. The authors consider important the constant connection with the development of autonomous work, the experimentation and pre-professional practice through the different forms of organization of teaching where the scientific student activity is included in the various curriculum subjects that generate motivation in students to raise to the maximum expression the learning process of the science in question with which they have been involved.

The above criteria coincide with those addressed in a letter to the editor of Alfonso (2015), when writing about the low participation of papers related to the subject of medical education and warning about the importance related to the state of educational and pedagogical research at the university medical as a need for permanent updating.

The authors of this work show that in order to adequately face the challenges for the implementation of the curricular redesign of Ecuadorian nursing programs, within which the consolidation of labor research activity and curricular training for research is addressed, projection and preparation for undergraduate training with direct influence on postgraduate studies is essential (Pernas et al. 2019); in such a way we can refer to the ideal embodied by Oramas, Jordán and Valcarcel (2012), that in the pedagogical professional performance

include the levels of achievement of results in the performance of each teacher, both in attendance, teaching and research.

The results obtained from the diagnosis show the significant insufficiencies and potentialities, which are consistent with data obtained by Perez et al. (2018, 2019), who states that to support the training process it is necessary to take into account different spaces and contexts of student performance both in pre-professional and bonding practice given the criteria and analysis on the basis of student scientific research since they are important to take into account for their inclusion within the educational organizational forms and that their actions on a daily basis lead to the improvement of formative research in the different units of curricular organization given that Nursing training has a strong component of on-the-job education, for which the presence of scientific student groups is also necessary as an essential step for research training in undergraduate studies.

Conclusions

In general, it can be concluded that the systematization required for the direction of students in the training of investigative skills in their daily actions is not yet achieved as a necessary part of formative research, which could have a negative influence on the current state of the motivation of the respondents to participate and carry out student scientific work.

As for the preparation received by the subjects taught for the realization of scientific student work, there is still no strong enough link that leads to the increase in activity as an important part of formative research, given that there is multifactorial involvement in the personal components of the teaching-learning process for students and teachers, where the organizational aspects of academic activity are mostly fulfilled and the investigative part is disregarded.

Another important factor to take into account was that it was not possible to socialize in a pertinent way criteria about the planning of actions and strategies in order to link research in the contexts of pre-professional practice and skills acquired in the various educational organizational forms.

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