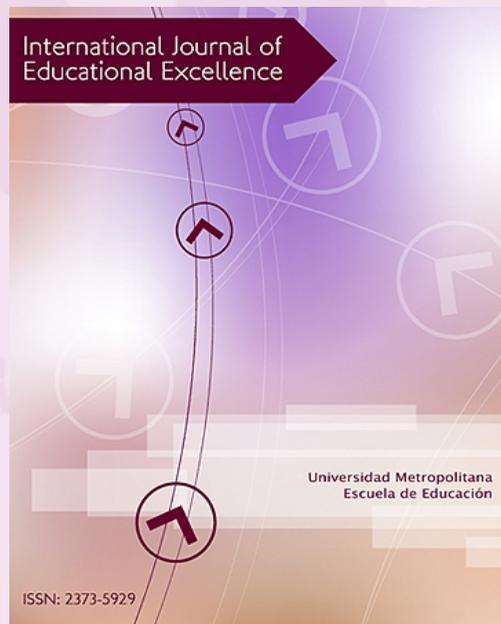


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Editor-in-Chief: **José Gómez Galán**

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International Journal of Educational Excellence

DESCRIPTION

The *International Journal of Educational Excellence* (ISSN 2373-5929) is a multidisciplinary scientific journal which main objective is the dissemination of studies that provide answers to the main educational scientific and social problems present in higher education, in order to achieve excellence quality in all their areas. Papers will be welcomed, regardless of the subject area to which they belong as long as they entailed a contribution, innovation or breakthrough in the development of models of teaching or scientific research in the scientific world which lead to a social improvement. Research work performed in other educational levels may also be considered, if they demonstrate a strong and justified relationship to higher education. All papers submitted for publication must be unpublished and originals, and should not be under any evaluation procedure for publication in other journals. Theoretical work as well as work based on field studies and empirical laboratory experiments are accepted. All kinds of strategies and methodological approaches may have been used for the study. They have to comply within the parameters of current scientific and technological research. The review criteria and selection process will take into account mainly the quality of the work under consideration: if it makes a significant contribution to the object of interest, main interests of the journal and if it offers a breakthrough or significant contribution to the current scientific knowledge and, ultimately, if it contributes to the progress of our society. This journal is of free and direct access (Open Access, OA), and it serves the international scientific community and open knowledge.

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Original submissions to the *International Journal of Educational Excellence* (IJEE) will be reviewed by external referees, a process known as peer review. Reviewers are academics and researchers who are experts in the corresponding specialized field of knowledge. Their main task will be to study all submitted papers critically and constructively. For a paper's evaluation a "double-blind" system will be used. This method consists of one in which authors and reviewers are not known to each other, aiming at a maximum objectivity in the evaluation of the manuscript. Those articles that are considered by the editorial and scientific committee of the journal with high possibilities for publication will be submitted to referees who will determine the relevance of their acceptance. It may be the case that they be sent back to the authors with suggested changes and then back again to the journal to continue with the evaluation process, which ultimately will assess the relevance of the article to be published or rejected.

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The periodicity of the *International Journal of Educational Excellence* will be two issues per year, and these will form a volume. The first issue is published in the first half of the year, the second issue in the second half. There is no deadline for the submission of manuscripts, which will remain open during the whole year and publication of the

article will possibly appear in the following issue after a positive evaluation of the work. For monographs, in which contributions to a specific topic will be requested, the deadline for receipt of manuscripts for evaluation corresponds to June 30 for the first issue and December 31 for the second issue, both referred to volume of the year following the call of articles.

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For all parties involved in the act of publishing (the author, the journal/publisher and the peer reviewer) it is necessary to agree upon standards of expected ethical behavior. The ethics statements for the International Journal of Educational Excellence (IJEE) are based on the Committee on Publication Ethics (COPE) Editors (www.publicationethics.org).

The value of scientific publishing relies on everyone involved behaving ethically. The publication of an article in the International Journal of Educational Excellence, a peer-reviewed journal, is a direct manifestation of the quality of work of the author and the institutions that support them. Peer-reviewed articles support and embody the scientific method. Ethics topics to consider: Authorship: Authorship should be limited to those who have made a significant contribution to the reported work. The authors should ensure that their study is original and written by them and their work has not been previously published and has been submitted only to the journal. / Originality: The authors should ensure that where material is taken from other sources (including their own published writing) the source is clearly cited and that where appropriate permission is obtained. / Data access: Authors may be asked to provide the raw data in connection with a manuscript for editorial review, and should be prepared to provide public access to such data. / Acknowledgement of sources: Proper acknowledgment. / Conflicts of interest: The authors should ensure that any real or apparent conflicting or competing interest is clearly stated on submission of their manuscript. / Reporting standards: Authors of reports of original research should present an accurate account of the work performed. / Human or animal subjects: The authors should ensure that they adhere to all research ethics. / Confidentiality and impartiality of the reviewers: The reviewers must maintain the confidentiality of the review process and conduct themselves fairly and impartially; immediately alert the editor-in-chief of any real or potential competing interest that could affect the impartiality of their reviewing and decline to review where appropriate.

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1. Introduction

The *International Journal of Educational Excellence* (IJEE) is open to all scientific articles which provide answers to the main educational and scientific problems currently impacting higher education with the purpose of achieving quality excellence in all areas. Papers will be welcome, regardless of the subject area to which they belong, as long as they entail a contribution, innovation or breakthrough in the development of models for teaching or scientific research within the university environment leading towards social improvement. Research work performed in other educational levels may be also taken into account, as well as they provide an adequate justification and a valid relationship with higher education issues.

All papers submitted for publication must be unpublished and original, and should not be under evaluation for publication in other journals. Theoretical work as well as those based on field studies and empirical laboratory experiments contributions, are accepted. All kinds of strategies and methodological approaches may be employed; however the selected method for each research has to be in compliance within the parameters of current scientific and technological research. The review criteria and selection process will mainly assessed the quality of the work under consideration in terms of the following criteria: significant contribution to the object of interest of the journal, a breakthrough to the current scientific knowledge and, ultimately, the contribution to the progress of our society.

2. Details for Submission

Manuscripts should be sent preferably sent in digital format. All manuscripts should be addressed to the journal Editor-in-Chief (email: jogomez@suagm.edu). Prior to submission, publishing standards should be carefully read at the following web site http://www.suagm.edu/umet/oa_pe_edu_ijee.asp. Only those articles that meet all the requirements and characteristics described at the web site will be accepted.

Submission of original digital file will preferably be in RTF format. The .ODF format is also accepted. Other formats (such as DOC, .PDF, etc.) are excluded.

In the rare event that the author (s) of an article cannot submit manuscripts electronically, the article shall be traditionally mailed. However, it should include a copy of the article in the previously outlined digital formats. Manuscripts will be sent by postal mail to the following address: International Journal of Educational Excellence (IJEE), Escuela de Educación, Universidad Metropolitana (UMET), PO Box 21150 San Juan, Puerto Rico, 00928-1150. The attention should be directed to: Editor in Chief.

3. Authorship and Responsibility

The author (s) of the article should submit one copy of the original article and a statement certifying that the work is original and has not been published before and that it has not been evaluated by another journal editorial committee.

The author (s) must also declare that [a] all named authors have materially participated in the development of the research or study that has led to the article, [b] any conflict(s) of interest, and [c] the sources of funding of research presented in the article or of the preparation of the research.

They shall also explicitly accept the journal rules of publication and the decision regarding the publication or rejection of an article. The *International Journal of Educational Excellence* (IJEE) assesses and requires all high international standards of ethical conduct of research and journal publication.



4. Preparation of Manuscripts

Articles should be submitted in proper English (British or American, however, but a mixture of both will not be allowed), whose length will be at least 3500 words and a maximum of 12,000, including references, notes, tables and figures. Exceeding this amount of words will be a major negative factor in evaluating the article, although articles exceeding this extension can be exceptionally published if they are properly justified and the work stands out for its quality.

The article must be preceded by an abstract thereof with a minimum of 150 and a maximum of 300 words. It must also be submitted in English language along with Spanish and Portuguese translated versions. The summary should also include five to seven key words in English, Spanish and Portuguese.

Articles of theoretical nature as well as those based on field studies will be accepted, and they will be considered as a positive evaluation element if those articles maintain the classical structure in scientific research papers, consisting of separate sections and subsections (eg. Introduction, Objectives, Methodology, Analysis, Results, Discussion, Conclusions, Appendices and Annexes, etc.). However, freedom is offered to the authors to establish the most appropriate structure, depending on the nature and characteristics of their research (and is especially significant in the case of theoretical articles). What is required in all cases is that the division of the article be clearly defined and numbered by the structure 1 (with 1.1, if 1.1.1, 1.1.2, etc.), 2, 3, etc. Each title and subtitle of the sections and subsections should be clearly identified through the use of spaces.

Standards of quotation, including references, must be governed by the style of the APA (American Psychological Association), contained in the *Publication Manual of the American Psychological Association*. Please see the following examples which are explained within the next paragraph:

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Whenever there is a quote of the author or authors of a publication, it should appear in the text in parenthesis followed by the year -for example if a single author is cited (Smith, 2014), if the citation refers to two to five authors (Smith & Brown, 2011 / Smith, Brown & Torrero, 2009), or if there are more than six authors (Smith et al, 2014) - and the full reference will appear in the list of references at the end of the article. If two or more works are cited, they will appear in the same order in the reference list separated by a semicolon (James, 2001, Smith, 2014). If in the article two or more references by the same author published in the same year are cited, they should be differentiated by lowercase letters (a, b, c, d, etc.) added to the year; in the text quote, the corresponding lower case letter will be used in each specific reference (Smith, 2014a).

If the citation refers to a general idea of the work, or if it is a general reference to an article, book or full investigation, but is not literally quoting a portion of the reference, it is only necessary to refer to the author and year of publication, without specifying the page intervals.

If the citation is literally quoting a text from a specific work, the author, year of publication and the page intervals should be entered preceded by "p" for example, according to Smith (2014) "the university teachers with many teaching hours have difficulty in carrying out research work" (p. 379), / in his study he argued that "university teachers with many teaching hours have difficulty in carrying out research work" (Smith, 2014, p. 379) but the author did not show the statistical analysis of the survey results.

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of ½ inch or 1.25 cm, maintaining this margin along the length of the cite. Page intervals should be indicated as described in the preceding paragraph.

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The manuscript should follow the general format not only meeting the scientific requirements requested by this journal but also identifying the best possible characteristics of the article. Submission the manuscript in digital format, or RTF .odf, double-spaced in a standard size paper (8.5 "x 11") or A4 (21 x 29.7 cm) 1 "(or 2 cm) margins, is recommended. Although any easily readable source may be used, the use of Times New Roman 12 point is recommended. The manuscript should include a header at the beginning of the page, providing the main scientific information of the author and the work. These data are:

Title: should be as concise as possible, reporting the content of the article. It should be taken into account that quite often titles are used by scientific database systems and information retrieval, so it is advisable that it contain words directly related to the content of work. It must not contain abbreviations or acronyms that are not widely known. The title should be centered as the first element of the header. The APA recommends that it does not exceed 12 words in length, but if it were required by the nature of the work, it shall not prevent the acceptance of the manuscript.

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Article: Below the keywords, the author will place the main body of the text submitted for publication in the International Journal of Educational Excellence (IJEE), in accordance with the recommendations given in this Guide for Authors.

Scientific and professional record of author (s): Placed below the main body of the manuscript leaving three lines and as the last element of the manuscript to be submitted. The scientific and professional background of each author should not be longer than 300 words, specifying recent published papers.

Notwithstanding the guidelines outlined above, it is strongly recommended for preparing manuscripts, to follow the APA style compiled in *Publication Manual of the American Psychological Association* (6th edition).

5. Publication of Articles

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Abstract: With the aim of optimizing and improving the design of curriculum in the field of official postgraduate university education, a modular curriculum protocol was designed and implemented to establish an agile and efficient procedure leading to the resolution of required claims during the processes (verification or modification) generated by the evaluation agencies, to which the different titles must be submitted. For its validation, the expert judgment technique and the implementation of an "ad hoc" rubric were used to verify its design and curriculum utility. Among the most important conclusions is that it is a relevant, agile and effective didactic tool for the different agents of educational action: those responsible for drafting new proposals, the body or internal commission of the university that supervises the process and the members that are part of the external evaluation committee. Lastly, this action protocol guarantees a homogenization of criteria, both with the professionals of education who prepare the proposals of official titles, and the experts who evaluate them.

Key-words: Curriculum, Skills, European Higher Education Area, Postgraduate, University Teaching.

1. Introduction

This article first presents a series of reflections on the competency-based approach that appeared in the second half of the 20th century in the field of human resources training and management in the countries of Western Europe and the United States (Rojas, 2016).

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The competence-based approach in the Knowledge and Information Society expresses a different vision in the educational field. Adaptation to the European Higher Education Area (EHEA) has led European universities to a great transformation (Gómez Galán, 2009; Krücken, 2014).

The ideal curriculum model in the 21st century should be based on the pillars of UNESCO's education (1996): learning to know, learning to do, learning to live together, and learning to be. Therefore, the main approaches to the educational process should focus on learning and the student from a competency-based educational approach, with the conviction that it will contribute to the improvement of the quality of postgraduate university education.

Although education systems are constantly revised and updated in such a way that there is a very close interconnection between social challenges and new educational models, in the course of the research carried out it has been found that most of the curriculum formalized to (Ordóñez, Caballero and López-Meneses, 2017). In order to achieve this goal, the university master's level, since the entry into force of Royal Decree 1393/2007 that regulates them, were implemented from a pedagogical perspective focused on teaching and based on objectives.

At present, competence-based learning is a requirement for new qualifications adapted to the EHEA (Calvo and Calvo, 2016), and it is intended to provide universities with a reliable assessment of students' manifesting and developing the acquisition of (Aguado, González, Antúnez and de Dios, 2017) and offer the best academic programs with an emphasis on the implementation of the evaluation of the students to help them achieve their goals (Acevedo, Moreno and Labajos, 2015).

1.1. Objective

The main objective of this article is the elaboration of a document, which synthesizes a work plan, that obtains the optimization and improvement in the design of the proposals of curriculum in the field of competences of the official university teaching of the Pablo de Olavide University (UPO), as well as such as the establishment of an agile and efficient procedure for resolving complaints that may arise during the processes to which the different titles are subject to verification, accreditation, modification or follow-up.

2.1. Regulatory framework

This section presents the normative frame of reference, from the international scope to the internal regulations of the university selected for the study, which bases the need to design curriculum based on competencies. For the design of an action protocol, the curriculum development of the university teaching leading to the obtaining of the official postgraduate degrees (Master's degree and PhD), which establishes a series of essential elements for the accomplishment of the proposed in the EHEA, all of these have been collected on time and specifically in the regulations for the development of

university reform in Spain in terms of adapting curriculum based on competencies.

In line with this Recommendation 2006/962/EC of the European Parliament and of the Council of 18 December 2006 on keys competences for lifelong learning, this document is based on the enhancement of competency-based integrated learning in the curriculum elements to promote a renewal in teaching practice and in the teaching and learning process. New approaches to learning and evaluation are proposed, which will require a major change in the tasks to be solved by the students and in innovative methodological approaches.

As regards the national scope, it should be noted that Royal Decree 1393/2007 of 29 October establishes the ordering of official university education, as amended by Royal Decrees 861/2010, 2 July and 99/2011, of 28 January (RD 1393/2007), which establishes a new regulatory framework that seeks to adapt all university degrees to the guidelines of the EHEA and to what was agreed in the Bologna Plan (2010).

RD 1393/2007, in its Preamble, prescribes the need to plan designs in official university master's degrees based on competencies and to follow a set of rules and conditions applicable to them in each case. These curriculum have to be verified by the Council of Universities (CU) and authorized by the National Agency for the Evaluation of Quality and Accreditation (ANECA in Spanish, 2012), which establishes a Support Guide for the elaboration of The Report for the request for verification of official degrees (Degree and Master Degree), which mentions each of the points marked in the action protocol to design curriculum based on competencies and provide the guidelines to follow for its correct fulfilment. Finally, to emphasize that the present scheme of work to design a curriculum is an informative supplement for the academic leaders, who take as reference this guide.

The official titles of education must be registered in the Register of Universities, Centres and Titles (RUCT), in accordance with RD 1509/2008, of September 12. At the UPO, the Centre for Postgraduate Studies (CEDEP) is the body responsible for providing advice to the Vice-rectorate competent in this area, academic commissions of official postgraduates and teams proposing new titles on issues to consider. In addition to ensuring compliance with these conditions and processing the requests for verification of the proposed new official titles. This is why CEDEP is in charge of organizing and managing the different postgraduate programs, in addition to performing the following procedures:

1. Report about the action protocol established and published.
2. Orienting on the internal procedures (realization of the memory of verification and report evidencing modifications, together with the responsible academics) and external procedures, implementation of the

information in the RUCT application web of the Ministry of Education, Culture and Sport, through from which the title is assessed.

3. Exhibition new proposals the titles will be implemented and raising the Postgraduate Commission to approval.
4. Conduct a follow - up study of titles in force and new proposals, communicate deadlines for submission of documentation, recommendations evaluators or advise in the newsroom agreements of collaboration, with other bodies, establishments and institutions of a character as public as private for the realization of external practices, or any other type of collaboration, including financial, or other universities if interuniversity programs.
5. Advise and accompany those responsible for titles in the doubts during the process of curriculum design.

Finally, as regards the autonomous level, in the procedure for the verification of official degrees the CU sends the curriculum to the Andalusian Evaluation and Accreditation Department (DEVA, in Spanish), to issue the corresponding report which is prescriptive and determinant. The process designed by the DEVA for the evaluation of proposals for new official teaching aims to generate the information required by the verification process, as well as for the authorization, if appropriate, of the implementation of the lessons.

2. Work scheme to design a curriculum based on competencies

This epigraph summarizes the necessary stages in which an academic responsible should reflect when he wants to innovate before a master proposal or wants to restructure a curriculum based on competencies. In an introductory way, the idea is centred, then a guiding scheme is shown and, finally, the work plan is broken down to design a curriculum.

As a background to the proposal for a new degree, two aspects coexist in the evaluation of a curriculum; it is about the feasibility and coherence of its training design. It is for this reason that we must first reflect and calibrate if the official education that one wants to implement is demanded by the labour market, if by the degree students of the institution itself there is intentionality to take it, the diversity of profiles that could be interested to obtain such university education. In addition, to analysing the availability of teaching staff and budgetary and/or regulatory constraints for hiring, if necessary.

In this sense, it is recommended that the proposed degree not focus exclusively on a type of academic profile, since building a population interested in the masters of different branches of knowledge will entail creating a multidisciplinary team that enriches the entire teaching - learning process and favours the acquisition of the proposed competences. Besides, it is important to contemplate the offer of similar degrees that can act as

competition to the demand in the same sector and analyse if it is an interesting proposal for the newly graduated students or for professionals who wish to specialize or improve and update their knowledge.

The university education must consider that the curriculum is based on the backbone of a curriculum proposal, of an integrating and articulating nature, generating spaces that establish links with the curriculum of each career, which will allow us to dynamize the construction of the competences from a meaningful learning approach, with the social, natural and cultural commitment, that provides sustenance to the protagonist role of the student (López Meneses and Gómez Galán, 2009; Icarte and Labate, 2016).

From a methodological perspective, the process of designing, implementing and evaluating a curriculum entails a series of tasks: to justify the need for the degree, to design and approve the training program, to control the implementation process and to evaluate the quality of the results (De Miguel, 1995).

Before listing the steps in Figure 1 that include the action plan proposed by the team of CEDEP, it should be noted that making reference to the article "Methodology for designing a curriculum based on competencies pre- and provided "(Fondón et. al., 2008) in structuring the design of a curriculum in ten steps, although there are discrepancies to what these authors present and composed of twelve major steps to help plan alternative poses a curriculum based on competencies.

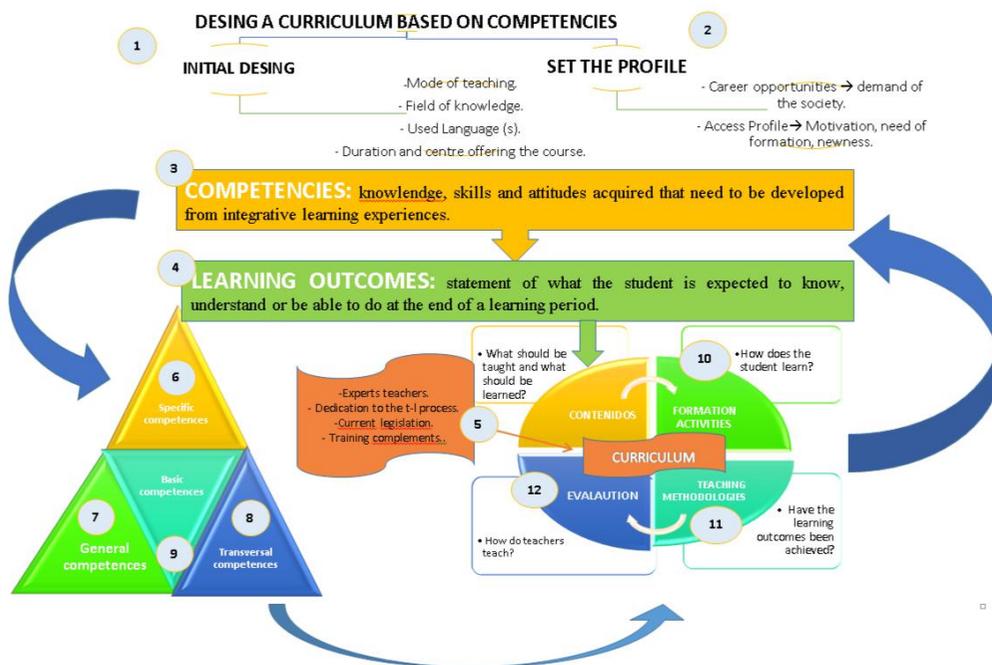


Figure 1. Scheme an action protocol for a curriculum based on competence.

In the following lines, the design of a scheme for an action protocol is explained, by means of a twelve-step breakdown, for the improvement and functional structuring of a competency curriculum. This scheme is accompanied by curriculum support material, a protocol to design a curriculum based on competence, developed to facilitate this process of convergence can be found at: <http://bit.ly/plan-estudios-competencias>

The structure followed in the guide of the DEVA, mentioned above, corresponds to the arrangement of points established by the RUCT application, elaborated on the basis of RD 1509/2008, dated September 12 and as stipulated in Annex I of RD 1393/2007.

However, the structure of the action protocol, supplementary material to the guide and this design scheme, does not follow the sequential order established in them. Since, following the research carried out on the design of the curriculum based on competences and the contributions of expert judgment detailed in the methodology, it is estimated that the logical order of the sections should be the one presented in the diagram of Figure 1 and detailed below.

2.1. Initial Design

The first approach to the idea of proposing a degree, is to decide with which nomenclature will be denominated, which will be the requesting university and the centre responsible for the title. Project if the proposal of the curriculum to be designed will be official and / or, if applicable, will qualify for a profession (for example, in the case of postgraduate level: University Master's Degree in Advocacy, Master's Degree in Secondary School Teaching, Vocational and Language Teaching, among others), as well as to differentiate the branch of knowledge to which it belongs and the field of study to which it will be linked. Decide which kind of teaching will have presence or distance (online).

Designing a competency-based curriculum allows universities to clarify the skills needed to successfully cover different jobs, prepare graduates with competencies that ensure them a successful performance, maximize productivity and efficiency of investments in training and Development (Lucia and Lepsinger, 1999; Aguado, González and Antúnez, 2017).

Ultimately, another important aspect to take into account is the number of credits of the masters, between 60 and 120 according to mark RD 1393/2007, and mainly of this, although there may be other conditions, the duration of the masters to be derived of temporary limitations, and may be of a single academic year, or of two academic courses, including the possibility of offering specialization in some specific area of the immersed area. It is necessary to take into account both the rules of enrolment and permanence established by the current regulations, as well as the language of instruction of the classes.

2.2. Set the profile

The profile of the students who will have to choose to study is interesting and is a factor to be taken into account and should be analyzed with some degree of depth, since, in addition to assuming the niche of future applicants, will be the basis of the it has to be started in order to strengthen knowledge, although it is of the utmost importance to focus the interest on the egress profile, since it is the defendant of society and is a profile that one wishes to model after studying the proposed studies. Authors such as Ferra, Morales and Asvin (2014) argue that the profile of students is one of the main elements that make up the curriculum.

2.2.1. Analysis of the exit profile

The profile of the students who will have to choose to study is interesting and is a factor to be taken into account and should be analyzed with some degree of depth, since, in addition to assuming the niche of future applicants, will be the basis of the it has to be started in order to strengthen knowledge, although it is of the utmost importance to focus the interest on the egress profile, since it is the defendant of society and is a profile that one wishes to model after studying the proposed studies. Authors such as Ferra, Morales and Asvin (2014) argue that the profile of students is one of the main elements that make up the curriculum.

2.2.2. Anlaysia of the income profile

In the educational reality, the need to adapt to constant changes in the labour market as well as in the social sphere in general (Cano, 2015) makes the demand of the new entry candidates very varied. Therefore, the need to consider a series of personal, motivational and acquired competences must be considered, so that incorporation into the new degree is the most enjoyable and productive, based on the fact that the qualifications of origin are related to the profile described. Internal consultations must be established with the degrees offered in degree that give access to the proposed degree to know the detail of the training (the skills acquired) and to be able to focus the level of postgraduate to the success of training and professional.

2.3. Building curriculum based on competencies

A curriculum based on competencies must be built based on the income profile and the articulation of the competences that carry out the learning process (Velasquez and Ramos, 2016). At this stage it is necessary to define the overall competences that should have the students after completing the degree. It is necessary to think what the labour market demands, to focus the curriculum in the preparation of students on the acquisition of these competences.

On this line, as these authors put it: "Its structure must be based on a coherent conceptual model and in its design it is necessary to take into account all the parameters that define a training program: competences, contents, modalities of teaching activities - learning, evaluation system "(Díaz et al., 2004, p.30).

The construction of curriculum is a participatory process of various stakeholders interested in the proposed degree, in which they must provide different points of view to enrich the structure of the curriculum and get students to finish their studies being fully competent for the profession demand. It is one of the most important commitments that must be assumed by all the bodies involved in university education: on the one hand, the Ministry with competences in University Education and the Autonomous Communities, as regards the general bases and guidelines for training in the various degrees. The universities in what affects the study plans and departments and teachers, in what concerns the programming of concrete subjects (Zabalza, 2007).

2.3.1. Definition of professional skills

Once the professional profiles are established, including the researchers, since they are considered as research professionals. Framed in the degree has to define the professional skills that characterize them. They will be called level 1, since in later steps they will be delimited in different categories for a better acquisition.

White papers issued by ANECA (2005) for undergraduate degrees, although not designed for higher education at the master's level, can serve as reference and reference manual for establishing the professional competencies of postgraduate graduates. These documents are non-binding, but have value as an instrument for reflection and were presented to the former University Coordination Council (current Council of Universities) and the former Ministry of Education and Science for their information and consideration.

The competences are intended to highlight the set of skills, knowledge, skills and attitudes that must develop and strengthen students to effectively build domains of performance in cognitive, social, cultural, professional and productive affective learning activities. That they evidence the acquisition of the same ones from integrative learning experiences in which the knowledge and the skills interact with the intention to give an effective answer in the task that executes, within a specific context (Ordóñez, Ramírez and Rey, 2017).

In a repetitive way, the competences proposed in this section should define the aspects in which students should be proficient in graduating from the degree, so our intention in all curriculum design should be how to achieve the acquisition of those competences.

2.4. Learning outcomes

Define a list of learning outcomes, that is to say, state what students are expected to have learned after completing the master's degree.

It is a statement of what the student is expected to know, understand or be able to do at the end of a learning period, correlated with the competences exposed (Polo, 2016).

In this sense, the ANECA Support Guide (2013) for writing, putting into practice and evaluating learning outcomes can be very useful. It is a document that intends to guide the design of titles, teachers, students, evaluators and agencies in the entire process of designing, implementing and reviewing curriculum.

2.5. Structure of the curriculum

In order to structure a curriculum, the learning results must be extracted from all the competences presented, and from these results it is deduced what will be the contents that consolidate the curriculum. For a better understanding, these should be grouped by subjects, and in turn, in a global way by modules, that show a clear conceptual relation.

As a clarification, keep in mind that learning is not only a matter of accessibility to knowledge, nor a content assimilation issue alone (Magro, 2012); consequently, content must be structured as intentional themes for the acquisition of competencies.

This process will be evidenced by the nomenclature of the subject, the dedication of the teaching staff regarding the teaching hours, in addition to the hours of dedication on the part of the students; the nature of the subjects: compulsory if they must be taken by all students enrolled or optional to define a profile more specialized in the different proposed itineraries: research or professional itinerary.

The general purpose of the curriculum is for students to fully develop their competences through the provision of content by teachers who are experts in the different areas of knowledge. For this, teaching will be very specific in each of the subjects.

From the learning results, a team of experts should organize them into homogeneous groups that give rise to the subjects. In this stage of the action plan, it will be the experts in the field, who know how to identify what contents are to be taught in each subject and how all of them maintain the necessary relationship to constitute a module that differentiates between optional and compulsory of the same because they contain the minimum contents required for all students regardless of the selected itinerary, if applicable, professional or researcher. The scope of specific knowledge in charge of teaching in each of the subjects, that is to say, area and department, should be foreseen. If for any of the proposed subjects a more specific knowledge base is required that only the students have a very specific

qualification, a series of additional credits with complementary training contents can be proposed, which only students who have not been able to take Certify through professional experience or academic training that possesses such prior knowledge.

Once all the curriculum subjects have been specified, one or more additional iterations should be carried out that review the overall coherence and detect possible overlaps or deficiencies between related subjects (García, Sánchez and Gavalda, 2006).

2.6. Specific competences

After incorporating the contents into the curriculum it is very easy to delimit what the specific competences that will be required of students, in line with the nomenclature that is specific to each subject, since each subject or subject will be a set of subjects that will differentiate it from the others (Ordóñez, 2017).

2.7. General competences

Starting from the grouping of contents by interests and teaching areas, as specified in stage five of this process, once the specific competences have been delimited, we proceed to mention the general competences of the teachings university official masters, for this must review the professional skills exposed in stage three.

It is possible and recommended that the same general competence be dealt with in more than one subject, a general competence can be established for each of the modules proposed and that it is assumed, as mentioned above by several subjects, since this typology of competencies must be acquired from different perspectives given their general character (Fondón et al, 2008).

2.8. Transversal competences

In the context of the various European conventions on convergence in the EHEA the Tuning Education Structures in Europe project was developed (González and Wagenaar, 2003), in which, among other things, a set of transversal competences that university students must acquire in addition to their technical skills.

Through the cross-disciplinary competences, it is sought to strengthen the professional as a person, since it serves no purpose, to train student's brilliant in terms of knowledge but with personal deficiencies that hinder the integral formation of the individual. Equal importance should be attached to training in values, democratic attitudes, social and civic responsibilities; whenever possible, current topics should be used that cross all learning units in the curriculum (San Martín, Cabrera-Martinez, Abalos-Labruzzi, and Gómez-Galán, 2015).

Also transversal competences are established equally for all courses taught in the same institution or center, in our case, in the UPO, as published in the article *Teaching Innovation Proposal: The inclusion of transversal competences in official university Master's degrees and the strengthening of democratic values* (Ordóñez, 2017), in this paper mention is made of the competences implemented in the 2016/2017 academic year in several masters subject to modification or verification, which have a favourable report by the evaluators of the DEVA.

2.9. Basic competences

Under this heading, the basic competences are dictated according to the current legislation that establishes a series of minimum competences for postgraduate level, so it is necessary to include in the curriculum the basic competences (established by Royal Decree 1393 / 2007). These will be common to all degrees, irreplaceable and non-modifiable.

2.10. Formation activities

This stage of the process consists in identifying how to make the students learn in the most dynamic and innovative way the knowledge of the degree, through the implementation of different training activities.

In order to clarify, the training activities should be differentiated and specific for each subject, depending on the competences to be acquired by the students in each of them (Ordóñez, Ramírez and Rey, 2016).

The recommendations presented in another paper (Ordóñez, Caballero and López-Meneses, 2016) can be consulted for training activities, teaching methodologies and evaluation systems.

2.11. Teaching methodologies

The most suitable for developing a curriculum, teaching methods of integrating topology are leading to the acquisition of skills, especially basic, at the same time they will be made in line with the teaching method chosen for the title (on site class, from distance...).

Note that in the framework of teaching methods, besides offering a series of educational techniques that facilitate carrying out training activities indicated in the previous stage, it should be emphasized the use of tutorials, either individually or collectively as make a helper and academic, personal and social, to carry out comprehensive training (Velasquez and Ramos, 2016).

For example, the mentoring should be seen as a centered teaching-learning strategy, in which there is a horizontal relationship, a deal between equals that encourages stimulating development and personal identity and their intrinsic capabilities for both academic improvements as a professional.

2.12. Evaluation

With this stage the process set out in the scheme of work to design a curriculum based on competencies is terminated, since evaluation systems are the mechanisms closure process, that is to say, contain the necessary tools to verify that It was successful the process exposed. Authors like Ferra and Lopez (2016) find that evaluating is not the mere fact of qualifying, but evaluating involved, make proposals to improve, reflecting response to deficiencies and reward achievements in order to make value judgments and make decisions that will leverage the strengths and correct weaknesses of each student. In the same discursive line, Rodriguez (2010) indicates that it must be an intentional, systematic, relevant and participatory process in relation to understanding, regulation and improvement of teaching and learning.

In short, it is estimated that evaluation should be an integral process that includes theory and assessments of students to improve educational practice and curriculum innovation. In accordance with Roldán (2005), it is an objective and continuous process that develops in spiral of comparing reality (competences and structure of the current plan). The true meaning of the evaluation is to verify that the learning outcomes have been acquired by the students, this would define that students graduate truly competent in the matter.

3. Material and Methods

The methodology is one of the backbones of any investigation that crystallizes the pillars to achieve the objectives, so in this section are described the two studies carried out. The first study presents a road map to design a curriculum based on competence and verification of the same data, collected using two different tools: expert opinions for the validation of the design and a map of dependencies to verify the veracity of the proposal.

The second study provides validation by an expert opinion of a protocol to structure the competency-based curriculum and its subsequent improvement of supervision by the evaluation of the rubric carried out under the supervision of a group of researchers. The results of the Rubric of evaluation are with a view to the future to incorporate, where necessary, new contributions of the agents involved in the process, being these academics responsible, external evaluators, team members work CEDEP, etc.

3.1. Study 1

The steps set forth in the scheme of work to design a curriculum based on competences have been validated by an expert opinion of EduInnovagogía Group (HUM-971): <http://bit.ly/1sGHwqO> to verify its design and utility as

for the development of innovative approaches to curriculum competency titles linked to official university master's teachings.

In this sense, it is premised that this protocol meets the attributes of an expert opinion, it is considered an informed opinion of people with experience in the subject, which are recognized by others as qualified it experts, and they can provide information, evidence, judgments and assessments (Escobar-Pérez and Cuervo-Martinez, 2008).

With regard to the reliability of the instrument for gathering information, a measurement is reliable or safe when applied repeatedly to the same individual or group, or simultaneously by different researchers, it gives the same or similar results (Sanchez and Guarisma, 1995).

To validate the process that all powers are fully related in the curriculum, with no overlap or deficit for any subject, it is appropriate to establish a map of dependencies in which all powers of any kind are displayed and all subjects that make up the titration (Albizu et al., 2006). An example of how the relationship can be established on a map of units shown in Figure 2; only illustration of a subject is clarified, but likewise should relate all the materials that make up the curriculum.

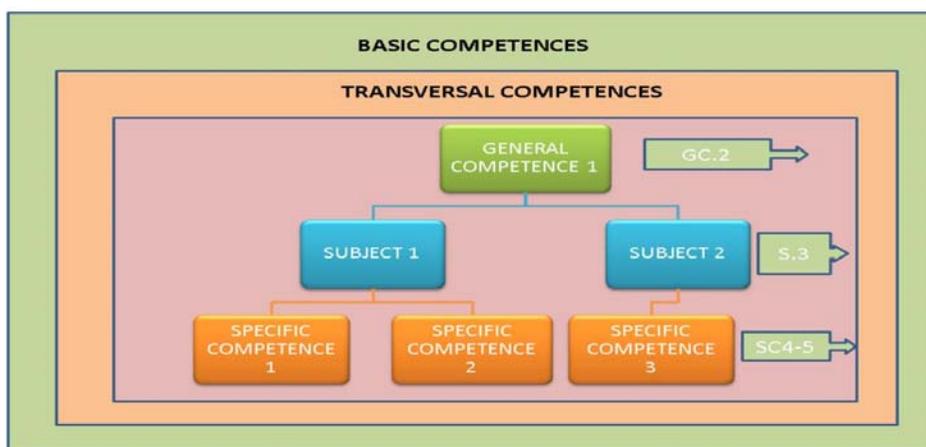


Figure 2. Map dependencies of competences.

Most academic or educational institutions need to improve the competence level proposed in their teaching guides for optimum degree of employability of future graduates. Since the 100 titles that have done extensive literature review from 2009 to 2016, a 65% of them have had objections from the DEVA on skills.

On the other hand, although there is no documentary evidence of qualifications concrete masters maintaining global coordination in establishing the competencies of each subject, experience in reviewing qualifications of

masters makes us confirms that most curriculums, reflected the sum of powers established in the different areas of knowledge involved in it. This methodology can lead to the origin of the same competition overlaps, gaps or repetitions of skills.

To conclude, note that if the dependency map skills once formulated curriculum is used ensure that competition is not seen in the planning of lessons.

3.2. Study 2

A preliminary study was conducted on March 6, 2017 the first version of the action protocol by the directors of research together with specialized educational training of EduInnovagogía Group (HUM-971) teachers and the technical manager of CEDEP, with over ten years of experience in this area. Then, the meeting established with the heads of academic committees concerned to implement new proposals master, or update existing through a modification process; all data necessary for validation protocol performance were collected.

Rubrics are tools of unconventional evaluation can be defined as guidelines for assessing the quality of working, specifying the criteria to be considered and adequacy levels in each (from inadequate to excellent) (Andrade and Du, 2005; García-Ros, 2011). In addition, the rubrics are defined as assessment tools based on quantitative and / or qualitative scale associated with pre-established criteria that measure different aspects of the manual, in our case, and that will be evaluated for improvement (Torres and Perera, 2010).

The evaluation rubric Table 1, is designed to keep track of improvement in the protocol proposed action, the academic coordinators will assess the protocol document once you have implemented. As an example, the proposed master for the academic year 2018/2019 will provide us a feedback for the month of September 2017.

		Excellent	Improbable	Inadequate
		2	1	0
GENERAL FEATURES	PRESENTATION	The presentation of the action protocol is correct and orderly. The linguistic construction of text (sentences and paragraphs) is impeccable.	The presentation of the action protocol is acceptable but can be improved. There are some problems, of minor seriousness, in the construction of statements and / or paragraphs.	The presentation of the action protocol is incoherent and disorderly. The epigraphs are confusing. There are serious and repeated errors in the construction of statements or paragraphs.

ASPECTS OF DEVELOPMENT	DESIGN	Outstanding and attractive action protocol that helps to understand the different recommendations.	Action protocol simple but well organized.	Action protocol badly raised that does not meet the design criteria handbook of recommendations
	DEEP ABOUT THE TOPIC	Clear and substantial description of the topic, good number of recommendations.	Ambiguous description of the subject, some details that do not clarify the subject.	Incorrect description of the subject, without significant or scarce details.
	INTRODUCTION	It expresses clearly the intention of the action protocol, the justification and the antecedents of the same one.	Contextualizes in a somewhat disordered way.	The motivations are not understood nor the justification and / or antecedents clearly identified.
	BODY OF THE WORK	The action protocol advances in an orderly manner, the extension is proportionate and correct.	The action protocol has deficiencies in the exposure and the headings do not keep the proper proportion.	The action protocol is chaotic; its extension is disproportionate and illogical.
	CONCLUSIONS	The conclusions are clear and coincide with the approach of the action protocol.	The conclusion is present, but lacks clarity and order.	The conclusion is confusing and does not fit the approach of the action protocol.
FORMAL ASPECTS	ORTOGRAPHY AND SCORE	No orthographical errors and grammar correction	With less than three spelling errors, some problem in grammar punctuation, it does not disturb the reading and / or comprehension of the text.	More than three spelling mistakes and poor grammar punctuation
	GRAPHICS	The tables and figures are correctly used, they make sense and they help to understand the explanation.	There is no table or figure to help us better understand a concept. Some of the figures or tables are unnecessary.	The use of tables or figures does not clarify anything.
	BIBLIOGRAPHY AND NOTES	The bibliography meets the recommended criteria. The notes correctly cite the titles used and are used in a relevant way.	The bibliography is inconsistent. Some appointments are not correct. The notes are uneven.	The bibliography does not meet the recommended criteria. The grades are excessive or insufficient.

Table 1. *Rubric Assessment Manual.*

3.3. Results

This research is supported by a process stems from the need to estimate the content validity of a test, as noted above, it has carried out an expert opinion. To do this we have collected information systematically, following the steps pose Escobar-Pérez and Cuervo-Martinez (2008):

1. Define the goal of expert judgment: in this case is to validate the content in a test designed by a group of researchers (EduInnovagogía HUM-971) for structuring curriculum based on competencies.
2. Selection of judges: the review and evaluation by six judges is proposed, two of whom are experts in measurement and evaluation, two experts in designing curriculum competency with a career a decade and two academic leaders who have implemented the methodology of the work plan and the protocol.
3. Have explicit dimensions and indicators to be measured at one of the test items. First of all recommendations resulting from research conducted by the author, all references provided by the guidance offered by the DEVA and finally, all indications that refer to current regulations. This has allowed judges to assess the relevance, adequacy and relevance of each section.
4. Specify the purpose of the test. All judges are aware of the need and usefulness of action protocol, this has increased the contextualization of the judge regarding the test, in turn increasing the level of specificity of the evaluation; since the validity of the content of each of the sections is directly related to their use.

In our study, the experts responsible for validating the instrument action protocol have been selected because they are professionals with extensive experience, extensive knowledge and excellent skills in their fields. All have extensive training within the competence and two of them are professionals with responsibilities for verification and modification of university degrees. Experts have provided comments are shown in Table 2: Contributions of expert judgment.

Judges Experts	More Significant Contribution
Expert 1	Eliminate regulations and legislation (can be variable). Include index of the steps proposed in the outline.
Expert 2	Incorporate a different rate followed by the RD 1393/2007 sequential scheme.
Expert 3	List all tables and figures. Visualizing plus scheme to design a curriculum based on competencies.
Expert 4	Highlighting the contributions / recommendations of the author.

Expert 5	Reformulate sequencing paragraphs.
Expert 6	Include conclusions.

Table 2: *Contributions of expert judgment.*

All aspects that experts have mentioned judges have been taken into account and have changed for the final version of the action protocol.

4. Conclusions

In light of the foregoing and by way of summary, it follows that structure the curriculum with a competency-based approach shows a number of advantages for students to gain knowledge level of competence that serve him for social empowerment and professional development throughout his entire life. Therefore, the quality of educational processes by implementing a teaching methodology focused on students preparing to graduate as an engine of change in society and trying to get better employability is improved.

Moreover, the powers declared in the curriculum should allow processes internal articulation, vertically, to ensure achievement of the skills, abilities and knowledge that are formed in each cycle, fortifying their progress profile to exit, where the evaluation of skills acquired in each cycle certification evidencing performance achieved by students during the course of their learning in their training (Velasquez and Ramos, 2016).

For our part, by drawing at first scheme design to develop a curriculum based on skills and as development of the action protocol to be drawn from this research it is to ensure an invidious criterial homogenization, both with education professionals who make proposals for official titles, as people who evaluate them. In turn, the content and structure of this work plan to design a curriculum based on skills and performance protocol, the aim is to be useful for different agents of educational action: those responsible for drafting new proposals the internal organ or university committee to oversee the process, in our case the CEDEP and people who form part of the external evaluation committee.

The 83% of expert judges in validating the protocol determines that the sequential order determined in the guide support for verification of degrees of the DEVA, no logical order in the dynamics of work and thus, the protocol derived from this research it follows that to structure the steps outlined in the design scheme proposed in this article.

In this regard, it is noteworthy that the directions set out in the action protocol for improving competency curriculum have been implemented during the academic year 2016/2017 in some of the university degree level official master of the UPO and they will continue in implementing future editions given the acceptance received by academics responsible and obtaining favourable reports received by the rating agency.

Finally, we are aware that curriculums are never definitive, are proposed and tendency adapted to social and educational needs of the historical moment, so we have to monitor, renew and update taking into account the constant changes occurring in the society, the set of skills defined for each degree and therefore learning outcomes of the subjects. It is therefore the intention to have the present assessment rubric to keep track and get, if any, improvement thereof. In addition to analyzing the reports issued by the DEVA to get a systemic evaluation referred to its performance, it deemed necessary to track graduates to really determine whether they are achieving the powers proposed in the degree.

Ultimately and as a final conclusion, we believe that the Spanish university must continue to establish procedures and training course in the teaching community within the competence. In this sense, the team CEDEP work continues to offer help and advice to teachers, based on the scheme of work to design a curriculum based on exposed competencies and by disseminating the action protocol created following the detection of deficiencies training in this area. All in favour of better service to society, and guiding axis ultimate goal of the mission of the University.

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Nursing Students' Satisfaction during their First Year of Study in a Private University as regards the Integration of ICTs

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Abstract: The University, in keeping with the times, is moving towards a greater use of technology. Currently, college students are more exposed to technology integrated to the academic field as well as in their daily lives. This research article aims to measure Nursing students' satisfaction during their first year as regards the Integration of Information and Communication Technology (ICTs). The study was carried out in a private university during the 2015-2016 school year. The studied population consisted of 1,130 students enrolled in the Nursing program. Of these, two-hundred-and-ten student (210) were in their first year. We aim to investigate how Nursing students regard Internet use, technological knowledge applied to information and its relation to ICTs in a higher education setting. On the other hand, we will be able to observe whether there is any correlation between Nursing students' degree of satisfaction and knowledge as regards ICTs and sociodemographic variables. We propose that students exposed to ICTs will have a greater degree of satisfaction and academic achievement as compared to students not exposed to this type of technological tools. This study can help identify the most frequently used tools by students in the academic field as well as the need for technological innovation in Nursing programs curricula. This way, a curriculum adapted to technological innovation in the health field can be developed to prepare students in the use and correct management of ICT integration in an educational context.

Key-words: Nursing Students, Student Satisfaction, Nursing Programs, Information and Communication Technology (ICT), ICT Competence in Nursing, Teaching Methodologies, Professional Development.

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1. Introduction

Due to the arrival of technology as a tool to facilitate students' learning process, researchers in different countries have taken it upon themselves to measure the degree of technological integration in professional Nursing programs at the college level. The use, content adaptation and integration of technology in curricula appear to be elements defined by researchers according to their own reality and study environments.

The integration of Information and Communication technology (ICT) in the Nursing profession consists of two interlinking fields. The first is the integration of ICT in learning, which refers to the transformation of Nursing education so it entails a dependence on technology to offer classes and allow students to develop as professionals within the Nursing field.

The second field refers to the integration of ICTs to professional practice, which is the movement existing in health institutions where Nursing alumni work. These scenarios involve complex, highly technological equipment and machinery, and the use of ICTs is part of daily practice for nurses when offering care and treatment for patients (García Martínez, 2011; Llorente and Cabero, 2005).

Higher education is going through a series of changes which force it to acclimate to the demands and needs of current society, for which reason the academic field must be adapted to the needs of the university population. The university is confronting new challenges, including the integration of technology in curricula. Therefore, it is necessary for students to acquire the necessary competencies in an innovative world of extraordinary progress. The objective of this course of actions (Ballesteros, Franco and Carañana, 2012) is to encourage up-to-date information and education to meet the new demands of the work force.

1.1. Definition of Information and Communication Technology (ICT)

Information and Communication Technology is a concept which includes the Internet, computer and informatics to modify the way new generations are educated.

Although there are different definitions for the term ICT, we are adopting the definition by Adell as cited by Boude-Figuero and Ruiz-Quintero (2008, p. 230) for the purposes of this research paper, which define it as "the set of tools and procedures which allow for the acquisition, production, storage, treatment, communication, registry and presentation of information in spoken, photographic and data form contained as acoustic, optical or electromagnetic signals". ICT also includes electronics as technology aimed towards the support of telecommunications, informatics and audiovisual resources.

1.2. ICT as tools for the classrooms

We should highlight that what offers real potential in the classroom is the pedagogical use professors ascribe to the use of technology. Incorporating these tools to the educational experience should be the product of a constant reflection by faculty members. Some of the elements to consider are the teaching strategy used, skills to be developed, topic and problem studied in the classroom.

For the student to achieve academic success by means of ICTs, he or she must be learned in informatics and the competencies required for the proper use of technology. In this case, competency refers to a complex process by means of which the person carries out activities and solves problems articulating the knowledge and know-how with self-sufficiency, criticism and creativity. This simultaneously involves know-how, performance and attitudes. Know-how is associated with the dimension of knowledge; performance is associated with actions, including procedures, product development and strategies; attitudes can be placed within the dimension of being, along with motivation, initiative, disposition and other characteristics which can be identified in the personality of a competent individual. A competent person can be said to be qualified to carry out an activity, which means integrating knowledge, skills, disposition and specific conducts to carry it out.

Informatics in Nursing began to form part of curricula and direct patient care in hospital units, where they became integrated into the work field, since ICTs extends to health services in the midst of a cybernetic society. A Nursing student of a university which integrates ICTs as part of the teaching and learning processes must know the basic concepts regarding computer management and Internet use (Boude-Figueroa and Ruiz-Quintero, 2008).

Since the beginning of the millennia, great advances in technology have occurred so that the latest generations of students can easily access online information. Navigating in the Worldwide Web (WWW) is no longer a fixed activity, given that mobile devices such as laptops, cellphones and digital audio devices make access to the Internet possible at almost any time and place.

Wireless Internet access is provided to college students and ICTs are used as learning tools to promote access to downloadable teaching material (PowerPoint, video, audio, etc.) from Web sites (Harris and Krousgrill, 2008). As previously mentioned, teaching material and information is readily available for students in different forms independently of the time and place (Reynolds et al, 2008).

1.3. Definition of information technology integration

Morton (1996), as cited by Días (2009), pointed out that ICT integration does not just imply considering the computer as a tool. He considers that ICTs

can be thought of like any other tool, such as a whiteboard or projector, which can be used with little to no preparation.

Morton's vision leads us to consider the computer as a tool, allowing curriculum planners to keep working with the traditional concept of education based on the subject and the teacher as a transmitter of knowledge. The computer remains peripheral and marginal. That is to say, taking students to a computer lab does not necessarily imply integration, nor does using the computer as an electronic spreadsheet or allowing students who have finished work in other areas to use it.

Tejedor, García-Valcárcel and Prada (2009) have defined information and communication technology integration as the current means by which we remain connected to the world, part of the globalization process and daily life, whether it be in the domains of government, commerce, education, safety or health. It entails not just the ability to use the computer or Internet, but to intelligently use these tools to exalt human nature and promote wellbeing, particularly in educational settings.

ICTs are successfully integrated when they are used to support and broaden curricular objectives and to encourage students to better understand and construct knowledge. Its use should be part of the daily activities carried out in the classroom. That is to say, the objective is to involve students in the construction of knowledge and ascertain their understanding of the content presented. ICTs enrich activities and encourage students to demonstrate what they know in new and creative ways.

1.4. Learning environments

The integration of ICTs in curricula does not occur in one particular place, but rather in a specific learning environment. To build an environment ripe for integration, we must change our focus on teaching and learning. Many believe that it is easier for integration to occur in classes that promote knowledge construction and in which the professor acts as a facilitator. It is fundamental to pay special attention to the improvement of skills in ICT management by college personnel (Rozas et al, 2008).

Cabrero (2003) considers that the integration of ICTs to the educational sector is framed within a situation of change in educational models, in information users and occur in settings of constant transformation. This researcher defines the integration of ICTs as a modern cybernetic phenomenon whereby learning is produced and information is exchanged by electronic means using the Internet. The use of these tools imposes new forms of action for professors and students. It is not just using technology for the sake of using it, but about how, through its use, teaching methods are developed to make the process more efficient.

According to Jonassen (1995), learning environments consist of seven aspects which make them significant: the Active aspect, whereby students

participate processing information; the Constructive aspect, whereby students integrate new ideas to their wealth of knowledge; the Collaborative aspect, whereby students work in a community of learning in which each member makes his or her contribution, both to attain the established goals and to maximize others' learning; the Intentional aspect, by which students try to attain clear milestones and knowledge-related objectives (Internet, e-mail and video conferences), which allow them to expand these communities beyond the classroom; the Contextualized aspect, by which students carry out chores or projects related to real-life situations, or where these are simulated through activities centered on problem solving; and the Reflexive aspect, whereby students reflect on the processes carried out and decisions taken upon the completion of a project or chore and seek to articulate the learned content.

1.5. Informatics in Nursing

Universities have the responsibility of preparing alumni to carry out their professional roles according to the requirements of the work field. For this reason, research has been a means by which universities maintain their curricula updated, but it is no less true that the influence of social and work trends are also aspects considered by academic programs for the preparation of students.

The integration of ICTs during the last two decades in health systems has transformed health institutions into advanced establishments completely dependent on communication technology. Technology facilitates the diagnosis, treatment, monitoring and documentation of patient care (Gracia Martínez, 2011).

Currently, with the arrival of the Internet, the workforce of a globalized market has provoked an unprecedented transformation in health services. As a result of this global movement, Hernández Cortina, Wigodski Sirebrenik and Caballero Muñoz (2012) point out that informatics in Nursing became a discipline linking Nursing, informatics and information and communication technologies. They describe it as a basic competency for health professionals in general and nurses in particular for the 21st century. Its function is to interpret data to transform it into information and interpret information to transform it into knowledge so that it, through experience, can transform into wisdom. Caring is at the core of Nursing, and it requires nurses capable of critical thinking who are competent with technology without dehumanizing their actions, a skill which should be developed during the study of the profession.

During the late 60s, the first computer-based system was installed in developed countries. Its main purpose was the processing of orders, charge sheets and invoicing. Computers, digital agendas and digital audio recorders began to replace paper. As part of this development process, Nursing personnel has contributed to the acquisition, design and implantation of these

technologies, beginning during the 80s and, due to technological development, transforming into a new discipline, informatics in Nursing.

Hovenga (2007) points out that the first works in the informatics area within Nursing were published by Ball and Hannah, 1984; Grobe, 1988; and Hannah, 1985. Nurses which began working during that time were pioneers of the discipline and often began without realizing it, being involved with technology or out of simple curiosity to explore new fields of knowledge. The development of informatics in Nursing has been quick and has facilitated the integration of data, information and knowledge for support in the decision-making process of Nursing professionals as regards patient care.

The quality initiatives of the Institute of Medicine (IOM) from the 90s are still valid today. They are centered on the following safety tenets: Effective, Patient-centered, Timely, Efficient, Safe and Equitable.

These safety objectives are contained within the concept of “quality care” in the document entitled *Nursing: Scope and Standards of Practice of the ANA*. In this document, one of the central aspects set forth to improve practice is the proper use of ICTs and of information and knowledge within Nursing. This document defines the who, what, how, where, when and why of Nursing.

The relevance of informatics and ICTs within Nursing lies in the need to document and communicate patient care to guarantee continuity and uninterrupted quality. In fact, if Nursing data is to be included as information for the management level, it is crucial that it respond to the trends of hospitals with high technological and cybernetic proficiency.

The use of technology is crucial in the professional formation, not just because nurses at the forefront, but because they need to learn to use technology correctly, without dehumanizing. The focuses of care are the person, family and community, which can often be forgotten when technology is placed at the center.

Most current Nursing curricula have integrated aspects related to informatics and the application of the Nursing process, and have begun to digitally document information. Nursing schools have incorporated topics related to informatics in Nursing, basic computer classes, or workshops regarding the use of ICTs within the field of study. This has been deemed the re-evolution of Nursing, an evolution of the discipline towards its center, towards cybernetics or digitally-assisted care aimed towards improving precision in Nursing care as well as ensuring safe treatment for the patient.

One of the advances generated in the United States was the creation of TIGER. TIGER is a guiding principle for the educational reform within Nursing using information technology which allows Nursing professionals and students to participate fully in the development of the digital era of health services, building competencies, knowledge management, clinical standards and better practices (Hernández Cortina, Wigodski Sirebrenik and Caballero

Muñoz, 2012). In this sense, and considering the lack of information development within Nursing in Puerto Rico, it is necessary for Nursing curricula to adjust to this reality, as the trend in Nursing is towards ICT-centered practices.

1.6. Nursing based on Information and communication technology

ICTs are tools to improve communication and knowledge management within research, and at its center is the firm conviction that it will be the path towards improved health, wellbeing and towards economic improvement. These technologies are being incorporated in order to optimize existing resources. The application of ICTs holds an enormous amount of possibilities, and it plays a fundamental role in the future of public health in practically every process associated with health systems and scenarios within which related services can be provided (home, hospitals, workplaces, etcetera).

Espinola López, Ojeda Delgado, Ramos Ramírez and Robertti Pereira (2011) mention the tools used within health systems and which directly or indirectly affect Nursing services when integrating ICTs. These have been shown to be useful improving the quality of services within a reasonable and cost-effective period, for which reason they are evidently necessary when providing health services.

These authors point out that ICTs form part of contemporary health systems, and that Nursing professionals make use the following resources: digital clinical history, tele-nursing, tele-monitoring, tele-alarm, tele-consultation and tele-continuity of care. Additional resources include data collection and transmission, follow-up by phone and nursing intervention for fragile patients discharged during the weekend, as well as tele-information and tele-teaching.

Tejada Domínguez and Ruiz Domínguez (2010) point out that ICTs can generate a new model for the health services field and begin to transform the current health system, opening a wide range of possibilities for the renovation and improvement of relationships between citizens, patients and health professionals.

Factors such as an aging population, changes in lifestyle and growing life expectancy, among others, cause an increase in health expenditure due to excessive caseloads. ICTs have come to form part of the health systems, with the objective of holding up one of the fundamental pillars of wellbeing. ICTs help organize health services, optimize existing resources and provide better quality in services to patients.

ICTs have been shown to reinforce, support and improve the current health model, and Nursing, immersed in this scenario, has begun to make use of ICTs to guarantee attention, coverage and continuity of care, to improve the communication processes and to adapt available health resources to existing needs.

Tejeda Domínguez and Ruiz Domínguez (2010) add Health Portals as another use for ICTs. These are considered the gateway to satisfy the information needs existing within everything related to health services. Their goal is to improve health, quality of life and, it goes without saying, the wellbeing of citizens, through information, education for improved health and encouraging healthy lifestyles.

As regards tele-teaching, Tejeda Domínguez and Ruiz Domínguez (2010) add that the development of new technologies is generating different formation models, whereby teaching methodology and learning within the discipline of Nursing must be imbued with innovative tools such as technical and pedagogical support: one of these tools is the learning method known as e-learning. E-learning is a distance and web-based methodology which allows the professional to simply and comfortably obtain the desired expertise at any time and place. Moreover, it allows for outreach towards a large and geographically dispersed audience within relatively short time lapses. This new method of online formation requires an adequate computer-based teaching methodology through which both student and professor can carry out the formation process wholly and interactively. There are different types of such available in the market, such as Moodle, Dokeos, Ilias, etc. Their differences lie mainly in the resources offered, such as discussion forums, chats, live conferences, workshops, glossaries, questionnaires, instant messaging, web links, etc.

Moreover, through e-learning platforms, the professor or tutor can provide the study material in whatever format is most convenient (Word, PDF, doc.xls, etcetera), and they allow for self-assessment and for sending messages and recommendations with the purpose of encouraging student participation in forums and chats, besides the ability to share academic chores.

González Ortega (2010) points out that ICTs represent a new strategy for Nursing which all universities and health systems should take advantage of at an international level. The author maintains that universities around the world have realized that Nursing is not just limited to care. Information technology can serve to acquire, produce, store, communicate, register and present information for nurses and other health professionals. They become one more gateway to encourage the diffusion of scientific evidence centered on people, families and communities.

ICTs include electronics as technology to support the development of telecommunications, informatics and audiovisual resources, and allows for the creation, generation, improvement and diffusion of knowledge in Nursing generated throughout its disciplinary development.

For Rexach (2003), the use of ICTs demands a wide and complex definition of the terms “alphabetized”, which imply competencies well beyond reading and writing in a computer. To be “alphabetized” implies possessing certain experience in the processing and sharing of information,

and it means being a critical and participatory reader. It could be said that nurses must be prepared to take on these new challenges and reflect on the professional implication of connecting to a technological web for communication, to acquire the competencies such a connection demands, including willfulness, and to know why and for whom the effort of using these new forms of digital communication is worth taking.

Not only have ICTs been integrated into health systems, but they have also been incorporated within Nursing education. Authors such as Sangrà i Morer and González Sanmamed (2004) point out that this great development has encouraged some writers within the health field to investigate teaching methodologies associated with the role of ICTs in Nursing. According to these authors, Nursing education through ICTs cannot occur at random and must be adequately planned out, which implies integrating ICTs to the theoretical content of the profession to later apply them in practical settings. For the practice of future health professionals to be successful, it must take place in hospital settings with integrated ICT services. This way, Nursing students will be able to understand the pertinence of using ICTs and develop the necessary skills in technological care.

2. Methodology

2.1 Design

The design was quantitative, transversal, descriptive and inferential, with a population of first year students within the Nursing program of a private university in San Juan, Puerto Rico.

2.2. Population

The population which makes up the study is of 210 students. All of them are enrolled in their first year of the Nursing program of a private university in San Juan, Puerto Rico. The sample is equivalent to the population, consisting of 210 students with an average GPA of 2.91 in a 4.0 scale upon graduation from High School.

The inclusion criteria for the sample were the following: first year students enrolled for the first time in an Associate's Degree (ADN) or Bachelor's Degree (BSN) Nursing Program, of either gender, older than 18 years and enrolled in either a day or night program.

The exclusion criteria were students within the Nursing program enrolled in their 2nd, 3rd, 4th year of study or more, students from other faculties, school, concentrations or careers as well as those less than 18 years old.

2.3. Participant recruitment

The researcher, as a member of the faculty where the research was carried out, took the following measures into consideration in order to minimize a conflict of interests:

She requested a waiver for the informed consent form, as per the principles of the Common rule for the protection of human subjects. The use of the informed consent form would have represented a significant disadvantage in the study, as potential participants were students at the university where the researcher works. Therefore, it would result in a possible bias in participants' responses, which would result in a study with untrustworthy results, in studies where the principle set forth in 45 CFR 46.117.c (1) is applied. The research could not have been carried out without the waiver, since the sole document connecting the participant to the investigation is the consent form, and the main risk factor would result from a breach of confidentiality.

The researcher read the informational sheet and instructions aloud to ensure comprehension and allowed time to answer questions. Once the orientation process was completed, the researcher gave the participant the informational sheet including the research description, risks, benefits and information regarding the protection of privacy and confidentiality. Participants were also informed that the questionnaire was anonymous and no personal information such as phone number, name or address of the participants was required, as well as that completing the questionnaires would take 15 to 20 minutes. Likewise, participants were informed that the risks were minimum, such as fatigue, boredom or lack of interest. Subjects who did not participate in the study should not fear retaliation by the researcher, as the study was completely free and voluntary. The informational sheet given to participants and read during the orientation indicated that participation was completely voluntary and that, should participants choose not to complete the questionnaire, they could do so at any moment without expecting retaliation by the researcher. Once the orientation for the investigation was complete and the questionnaires were handed out, the researcher was available to answer doubts or questions. Once the questionnaire was filled out, students were instructed to store it in the provided manila folder and deposit it in an urn provide and placed in front of the desk. Once the students had finished, the researcher proceeded to collect the urn and leave the classroom. The researcher was sole custodian of the urn and ensured nobody had access to it.

Once the data collection process was complete, the researcher proceeded to tabulate and analyze them. Information was not and will not be shared with third parties under any circumstances. Data collected from questionnaires were stored in a private place, in the researcher's house, safe and locked. All questionnaires will be stored in a locked file for a period of five (5) years under the care of the primary investigator. After these five years

have elapsed, the printed documents collected during the investigation will be shredded and the documents stored digitally will be destroyed.

2.4. Measurement instrument

In order to estimate the integration of ICTs by Nursing students during their first year of study, the tool titled *Attitudes and Interest towards ICTs* (Morales, FM, 2012) was used after due authorization by its author. This questionnaire is divided in five parts. Part I, Internet knowledge and general usage, consists of 7 items, where students choose their answer placing an (X) in the provided space. Part II, General computer knowledge, contains five items alluding to different types of computer programs or applications. Students chose their answer placing an (X) in the corresponding space, using a scale where 0 meant no knowledge and 3 meant thorough knowledge of the corresponding program. Part III, Functions of ICTs in the university context, contains 30 items, using a scale where 1 implies complete disagreement and 5 means complete agreement with the corresponding statement.

This questionnaire is complemented by Part IV, Satisfaction with ICTs. In order to construct this section, the tool entitled Use of Social Networks in Academic Activities in the Medicine School “Luis Razetti” was used as a model (Díaz, Miguel, Landaeta, and col, 2014) after due authorization by its authors. This section seeks to measure students’ degree of satisfaction with technology, with some premises directed to theory and others to clinical practice. Part V contained the sociodemographic information.

The instrument *Attitudes and Interest towards ICTs* was used after due authorization (Morales, FM, 2012) and, for transcultural modification and adaptation, was validated in San Juan, Puerto Rico by two experts, Dr. María Aponte, Professor, while the technological area was revised by Mrs. Gladys Cora Izquierdo, a specialist in Distance Education, Technology and Compliance.

As part of the validation process, an expert validation rubric as used modelled by the *Expert Panel Rubric* by Dr. Yanilda Rodríguez. This tool was translated to Spanish and approved by the principal author.

2.5. Dependent variables:

- Integration and use of Information and communication technology, better known as ICTs. Its integration was measured through the instrument *Attitudes and Interest towards ICTs* (2012).
- Satisfaction with ICT use, as measured by *Attitudes and Interest towards ICTs* (2012). Specifically, Part IV of the questionnaire was used for this variable. It contains 12 total items including educational experiences in both theoretical courses and clinical practice of first-year students of a Nursing program.

- Academic achievement was estimated by the cumulative average of the studied population by means of a question appearing at the end of the previously mentioned questionnaire, as part of the sociodemographic information (Part V).

2.6. Independent variables:

Sociodemographic variables collected in Part V, Sociodemographic information, from the same instrument, *Attitudes and Interest towards ICTs* (2012), which included:

- Gender: Qualitative, nominal, dichotomous (female/male).
- Civil status: Qualitative, nominal, dichotomous (single/married).
- Age: 18 to 25, 26 to 30, 31 to 36 and 36 or older.
- Study program: Qualitative, nominal, dichotomous (BSN–Bachelor’s/ADN – Associate’s Degree).
- Socioeconomic profile: Qualitative, nominal, polychotomous (lower class/middle class/higher class).
- Area of residence: Qualitative, nominal, dichotomous (Rural/Urban).
- Work: Qualitative, nominal, polychotomous (yes, full-time job/yes, part-time job/no job).
- Children: Qualitative, dichotomous (yes/no).
- Program in which you acquired 12th grade diploma or equivalent: Qualitative, nominal, polychotomous (public school general program/public school commerce program/public school vocational program/12th grade equivalence test/private school/homeschooling).

2.7. Research procedure

Before receiving the approval of the Institutional Review Board of the Ana G. Méndez University System (SUAGM), San Juan, Puerto Rico, the researcher obtained the Confidentiality and Privacy, Responsible Conduct of Research, Institutional Review Board and Health Insurance Portability and Accountability Act certificates. These tests are required by the Ana G. Méndez System and its Compliance Office when employees, visitors or enrolled students from any of its educational institutions are to be used for human research purposes. In this case, to carry out the study in the private university, the researcher obtained the SUAGM IRB certificate to submit her investigation with the objective of safeguarding the subjects’ privacy and to guarantee confidentiality and secure management of the information related to the investigation. The researcher also met with the Dean of the Health Sciences Faculty to obtain approval for the study. Authorization was also requested and obtained by the Vice chancellor to carry out the investigation. Once authorization by the SUAGM IRB was obtained, the primary investigator met with the Directorate of the Nursing Program, who provided the list of days and classrooms for first-year Nursing students. Likewise, a

meeting was coordinated with faculty members to notify which courses had been selected for the recruitment of first-year students.

In this meeting, the investigation and its purpose was presented to Nursing faculty members. The professors were told which of the courses had been selected. The researcher then coordinated the date and time of her visit to the classroom directly with the professor of each Nursing section.

2.8. Data analysis

The statistical analysis was descriptive, using central tendency and dispersion measurements for quantitative variables and frequencies and percentages for qualitative variables. The possible correlation between degree of satisfaction and achievement with the integration of ICTs was identified. Similarly, an inferential analysis was carried out with Chi squared measurements for quantitative variables. In order to identify possible confounding variables, a multivariate analysis was carried out. SPSS 20 was used for data entry and analysis. This allowed for the results to be evaluated with greater ease and precision. To determine whether there is a relationship between satisfaction and use of ICTs in an educational context and academic performance by students, contingency tables and the Pearson χ^2 statistical test was used for categorical variables.

3. Results

The results of the statistical study as per the purpose of the investigation, to investigate the satisfaction of first-year Nursing students in a private university as regards Information and communications technology (ICT) and its relationship to academic achievement, are hereby presented. Studies comparative to this investigation were used as a reference for the explanation of the obtained results. The results were interpreted as per the corresponding measurement scales. It is important to emphasize that this investigation contains three different measurement scales which take into account computer knowledge, degree of satisfaction with ICTs in an educational context and degree of satisfaction with ICTs in Nursing classes. Each measurement scale was developed specifically for the variable measured, so each one of them is particular. Before evaluating each objective, the corresponding measurement scale will be reviewed. The reliability coefficient for the instrument will be presented first.

3.1. Reliability coefficient for the instrument (pilot test)

In order to measure the reliability of the data collection instrument, the Cronbach's Alpha coefficient was obtained. Cronbach's Alpha is used to determine the internal consistency of the test. To determine reliability, this coefficient uses values between 0 and 1, where 0 indicates no reliability and

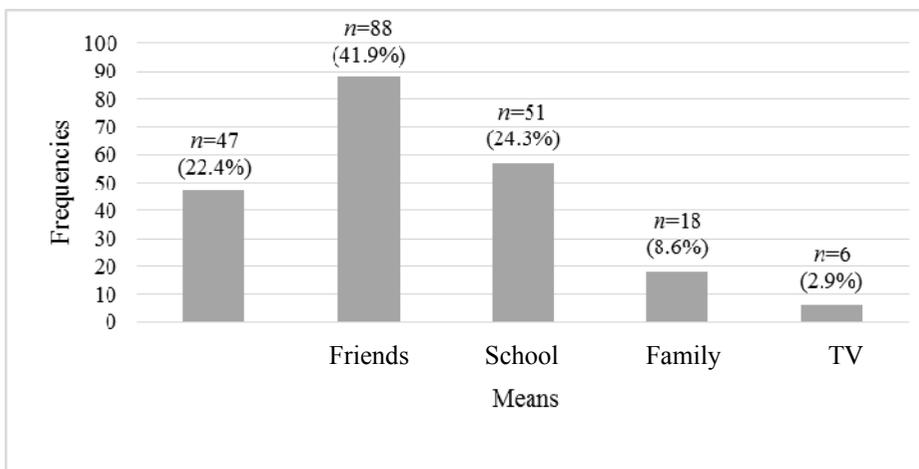


Figure 1. *Distribution of students by means through which he/she became familiarized with the Internet.*

99.9% of students indicated having some type of electronic device (computer, tablet, smart phone). The remaining 1% indicated not having any (figure 2).

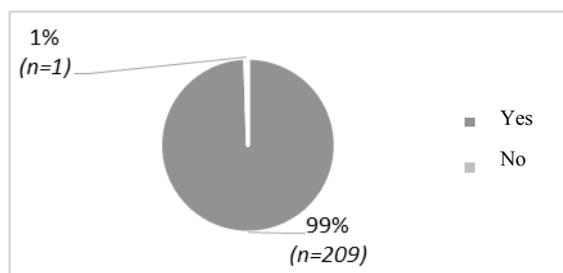


Figure 2. *Percentage distribution of students who have some type of electronic device.*

As regards the place where the student regularly uses the Internet, as seen in graph 3, 74.8% of students mentioned their house. 13% indicated connecting from their institution/university and 11% from other places, in this case from their cell phones. The lowest number was seen for the workplace (0.5%) and 1% of students did not answer.

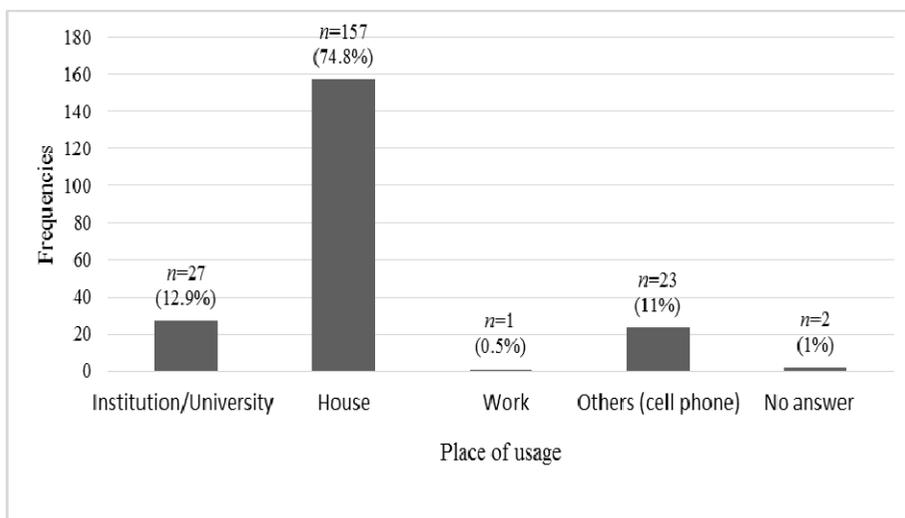


Figure 3. *Distribution of students by places from which he/she regularly uses the Internet.*

As regards daily use of the Internet, as seen in graph 4, 57.4% of students indicated using the Internet more than 10 times a day. 18.7% used the Internet between 4-6 times, 14.4% between 7-9 times a day. The lowest number was seen in the following categories: between 1-3 times (7.7%), no daily use (1.9%) and 0.5% of students did not answer.

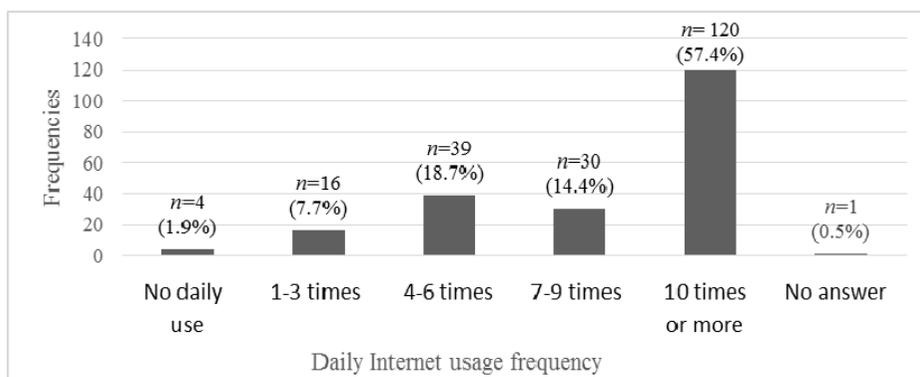


Figure 4. *Distribution of students by daily Internet usage frequency.*

As shown in graph 5, the participants mentioned social networking (40.9%) as the most frequently used online services 35.6% indicated frequent Internet usage for more than one service (e-mails, chat, forums, search engines, social networks). The lowest numbers were seen for chat use (7.2%), search engines and e-mails (6.3% each) and 3.8% who reported using other

services, means of communication or applications, while 1% of students did not answer.

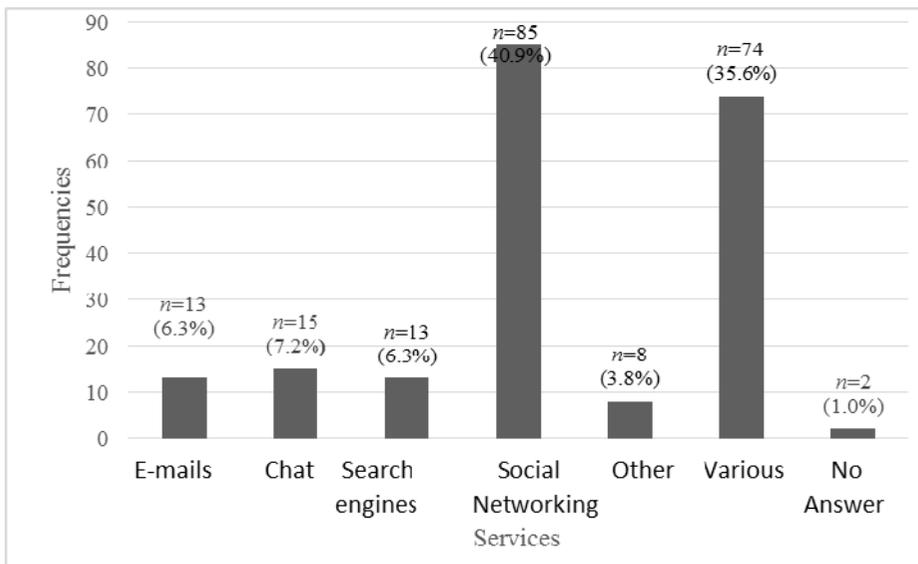


Figure 5. *Distribution of students by most frequently used Internet services.*

98.1% of students indicated that the Internet could be used as a resource within the classroom, 0.5% said it couldn't be used as a resource, and 1.4% did not answer, as can be seen in graph 6.

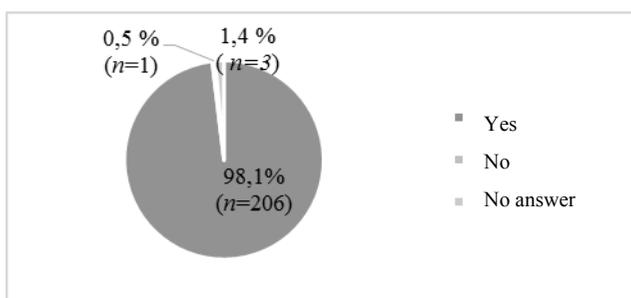


Figure 6. *Distribution of students by consideration of the Internet as a potential resource in the classroom.*

On the other hand, participants' level of knowledge of computers as regards programs and applications was also measured. As per the results shown in table 2, 90.5% of students ($n=190$) indicated having a high amount of knowledge of the Internet. 81.8% ($n=171$) indicated having a high amount of knowledge of presentations. 67.6% ($n=142$) indicated having a high amount

of knowledge of word processors. On the other hand, students indicated having little knowledge (37.1%; $n=78$) with spreadsheets. As regards databases, students indicated having little to no knowledge (39.6%; $n=80$, 31.2%; $n=63$, respectively).

Computer Programs/Applications	Level of knowledge								N	Don't know/No answer
	None (0)		Little (1)		Sufficient (2)		High (3)			
	F	%	F	%	F	%	F	%		
Word Processors			8	3.8	60	28.6	142	67.6	210	
Databases	63	31.2	80	39.6	37	18.3	22	10.9	202	8
Spreadsheets	18	8.6	78	37.1	58	27.6	56	26.7	210	
Presentations			4	1.9	34	16.3	171	81.8	209	1
Internet	1	.5	1	.5	18	8.6	190	90.5	210	

Table 2: Frequency distribution of students' knowledge of computer programs or computer applications.

As can be seen in table 3, the highest levels of knowledge were seen for the Internet (2.89), presentations (2.80) and word processors (2.64). According to the classification scale, this indicates a good amount of knowledge. On the other hand, the lowest numbers were seen for spreadsheets (1.72), classified as a sufficient amount of knowledge, and databases (1.09), classified as a low level of knowledge.

Computer Programs/Applications	Average	Median	Mode	Standard deviation	Level of Knowledge
Databases	1.09	1	1	.963	Little
Spreadsheets	1.72	2	2	.963	Enough
Word Processors	2.64	3	3	.556	High
Presentations	2.80	3	3	.477	High
Internet	2.89	3	3	.369	High

Table 3: Descriptive analysis of the students' knowledge of computer programs or applications.

Establish the degree of student satisfaction as regards ICTs in an educational context.

For the presentation and interpretation of the results in this section, the student satisfaction scale as regards the use of ICTs in an educational context will be used: Completely agree (5), Agree (4), Neither agree nor disagree (3), Disagree (2) and Completely disagree (1). In order to simplify the presentation of frequency results, the categories were considered in the following manner: Agree (completely agree and agree) and disagree (completely disagree and disagree). The third category, neither agree nor disagree, remained as is. The following interval was established for the interpretation of central

tendency measures: Agree (5.00-3.50), Neither agree nor disagree (3.49-2.50) and Disagree (2.49-1.00).

Moreover, to facilitate and structure the interpretation, the construct statements were classified in the following three areas: use of ICTs in an educational context; use of ICTs in interpersonal relationships; and use of ICTs and socioeconomic factors.

Most of the students agreed with the statements measuring satisfaction with ICTs in the educational context. The highest numbers were seen for students who consider that the Internet can be used as a teaching tool (91%), that the Internet favors the use of other languages (91%), that Internet videos can be very useful to acquire new knowledge, procedures and attitudes (87%), that movies with an educational basis (movie forums) are interesting pedagogical resources which motivate and facilitate active learning (84%) and that the Internet can be integrated to the professor's explanations using the whiteboard (83%), among other statements with lower percentages than those previously mentioned. On the other hand, a considerable amount of uncertainty was seen for the statement that positive values are transmitted through the Internet, with 51% of students choosing neither to agree nor disagree. 76% of the students disagreed with the statement that only highly intelligent students could use the Internet.

As regards the use of ICTs and interpersonal relationships in the educational context, table 5 shows students' disagreement with the statement that the Internet can replace the professor's function (65%, $n=135$). 83% of students expressed agreement with the statement that the Internet can be integrated to the professor's explanations using the whiteboard. This is an implication of the professor's importance guiding the teaching process in the classroom. Meanwhile, 59% of students expressed agreement with the statement that the Internet helps improve the relationship between members of the university and 75% agreed that the Internet can help you find new friends. The use of ICTs allows and promotes diverse interpersonal relationships in an educational setting. In keeping with this, approximately 70% of the students either disagreed or did not agree or disagree with the statement that the Internet jeopardizes the relationship between students as well as the student/teacher relationship.

Use of ICTs and interpersonal relationships in an educational setting	Disagree		Neither agree nor disagree		Agree		N	Don't know/no
	F	%	F	%	F	%		
The Internet can replace the professor's function.	135	65%	54	26%	20	10%	209	1
The Internet helps improve the relationship between members of the university.	26	13%	59	28%	123	59%	208	2

The Internet jeopardizes the student/teacher relationship.	71	34%	76	37%	61	29%	208	2
The Internet jeopardizes the relationship between students.	81	39%	77	37%	48	23%	206	4
The Internet can help you find new friends.	9	4%	44	21%	155	75%	208	2

Table 4: *Frequency distribution of students' satisfaction as regards the use of ICTs and interpersonal relationships in an educational context.*

The results presented in table 6 show that 68% of students disagree with the statement that the Internet can only be used in socioeconomically favored/advantaged/urban/rich/affluent areas. However, 42% agreed that a family's socioeconomic status facilitates access to the Internet, and 38% neither agreed nor disagreed with the statement.

Use of ICTs and socioeconomic factors	Disagree		Neither agree nor disagree		Agree		N	Don't know/No
	F	%	F	%	F	%		
The Internet can only be used in socioeconomically favored/advantaged/urban/rich/affluent areas.	139	68%	40	20%	26	13%	205	5
A family's socioeconomic status facilitates access to the Internet.	42	20%	77	38%	86	42%	205	5

Table 5: *Frequency distribution of students' satisfaction as regards the use of ICTs and socioeconomic factors.*

3.3 Determine whether there is a correlation between ICTs in an educational setting and students' academic achievement.

In order to determine whether there was a relationship between satisfaction and use of ICTs in an educational context and students' academic achievement, contingency tables and Pearson's χ^2 test were used for categorical variables. In the table, a summary of the answers obtained as relates to degree of satisfaction with the use of ICTs in an educational setting (disagree, neither agree nor disagree) is presented and compared to students' grade point average at the moment of the investigation. The results obtained were tested to determine whether there was a correlation between satisfaction and use of ICTs in an educational setting and students' academic achievement. The contingency table was used to register and analyze the relationship between two or more categorical variables, in this case two ordinal variables. The table shows that the proportion of observed values (O values) for levels of satisfaction with the use of ICTs were distributed differently according to grade point

average. To identify the statistical significance between the categorical values, the expected values (E values) were calculated for evaluation using Pearson's χ^2 test.

Degree of satisfaction with the use of ICTs		3.50 or more	3.49-2.50	2.49 or less	Total
Agree	O values	39	71	11	121
	E values	38.3	71.7	10.9	121.0
	Percentage	61.9%	60.2%	61.1%	60.8%
Neither agree nor disagree	O values	17	36	5	58
	E values	18.4	34.4	5.2	58.0
	Percentage	27.0%	30.5%	27.8%	29.1%
Disagree	O values	7	11	2	20
	E values	6.3	11.9	1.81	20.0
	Percentage	11.1%	9.3%	11.1%	10.1%
Total	O values	63	118	18	199
	E values	63.0	118.0	18.0	199.0
	Percentage	100.0%	100.0%	100.0%	100.0%

Note: O values are observed values and E values are expected values.

Table 6: Degree of students' satisfaction with the use of ICTs in an educational setting by grade point average.

The corresponding hypotheses are:

H0: There is no relationship between the degree of satisfaction with the use of ICTs in an educational setting and academic achievement.

H1: There is a relationship between the degree of satisfaction with the use of ICTs in an educational setting and academic achievement.

As can be seen in table 8, when applying the Chi squared test, the obtained p value was 0.986, greater than 0.05, the hypothesis rejection region, for which reason the null hypothesis was not rejected. Therefore, students' academic achievement is not related to satisfaction with the use of ICTs in an educational context (H0).

Therefore, the accepted hypothesis is the following:

H0: There is no relationship between the degree of satisfaction with the use of ICTs in an educational setting and academic achievement.

	Value	Df	Asymptotic significance (bilateral)
Pearson's Chi-squared	.361	4	.986
Likelihood ratio	.361	4	.986
Linear by linear association	.001	1	.977
N of valid cases	199		

Table 7: Results of Chi squared test for satisfaction with the use of ICTs in an educational context and academic achievement.

3.4. Analyze the support received by Nursing students as regards ICTs in their first year of university studies.

To determine the amount of support Nursing students receive as regards ICTs during their first year of university studies, frequencies for satisfaction with the use of ICTs in Nursing classes were obtained and contingency tables and Pearson's χ^2 test for categorical variables were used. The following table summarizes the answers obtained as relates to degree of satisfaction with the use of ICTs in Nursing classes compared with students' grade point averages at the time of questionnaire administration. These results were tested to determine whether there was a correlation between satisfaction with the use of ICTs and students' academic achievement. The contingency table was used to register and analyze the relationship between two or more categorical variables, in this case two ordinal variables. The table shows that the proportion of observed values (O values) for levels of satisfaction with the use of ICTs were distributed differently according to grade point average. To identify the statistical significance between the categorical values, the expected values (E values) were calculated for evaluation using Pearson's χ^2 test.

Initially, the results of table 8 allow us to identify that most of the students expressed satisfaction with the statements measuring satisfaction with ICTs in Nursing classes. The highest numbers for student satisfaction with the use of ICTs were seen with the statements regarding the use of PowerPoint presentations (86%) and Simulation in the Simulation Center (80%), among other statements observed to a lesser degree. However, it is important to point out that approximately 90% of students stated that they were either somewhat satisfied or satisfied with all statements measuring the use of ICTs in Nursing classes.

Statements	Degree of satisfaction with ICTs						Total	Don't know/no answer
	Dissatisfied (1)		Somewhat satisfied (2)		Satisfied (3)			
	F	%	F	%	F	%		
Searches in databases	4	2%	62	32%	129	66%	195	15
Blackboard use	15	7%	68	33%	123	60%	206	4
Virtual discussion	11	6%	94	51%	81	44%	186	24

forums								
PowerPoint presentations	2	1%	26	13%	176	86%	204	6
Prezi presentations	19	13%	53	37%	71	50%	143	67
Use of technology in theoretical classes	4	2%	51	26%	142	72%	197	13
Use of emails associated to the class or institution	4	2%	43	21%	158	77%	205	5
Use of electronic devices during class	5	2%	39	19%	158	78%	202	8
Virtual simulation	4	2%	49	28%	123	70%	176	34
Simulation in Simulation Center	4	2%	31	18%	140	80%	175	35
Exposure to electronic record	6	3%	53	31%	113	66%	172	38
Exposure to biomedical equipment	2	1%	32	20%	128	79%	162	48

Table 8: *Degree of students' satisfaction as regards the use of ICTs in Nursing classes.*

The following contingency table compares the degree of satisfaction with the use of ICTs in Nursing classes and students' grade point average at the moment of the investigation. It shows that degree of satisfaction with ICTs is spread differently according to grade point average (see observed "O" values). To identify the statistical significance between the categorical values, the expected values (E values) were calculated for evaluation using Pearson's χ^2 test.

Degree of satisfaction as regards the use of ICTs in Nursing classes		3.50 or more	3.49-2.50	2.49 or less	Total
Satisfied	O values	56	84	12	152
	E values	47.6	90.6	13.8	152.0
	Percentage	90.3%	71.2%	66.7%	76.8%
Somewhat satisfied	O values	6	34	6	46
	E values	14.4	27.4	4.2	46.0
	Percentage	9.7%	28.8%	33.3%	23.2%
Totals	O values	62	118	18	198
	E values	62.0	118.0	18.0	198.0
	Percentage	100.0%	100.0%	100.0%	100.0%

Note: O values are observed values and E values are expected values.

Table 9: *Degree of students' satisfaction as regards the use of ICTs in Nursing classes and academic achievement.*

The corresponding hypotheses are:

H0: There is no correlation between the use of ICTs in Nursing classes and students' academic achievement.

H1: There is a correlation between the use of ICTs in Nursing classes and students' academic achievement.

As can be seen in table 10, when applying the Chi squared test, the obtained *p* value was 0.009, less than 0.05, the hypothesis rejection region, for which reason the null hypothesis was rejected. Therefore, students' academic achievement is associated with satisfaction with ICTs in an educational context.

Therefore, the accepted hypothesis is the following:

H1: There is a correlation between the use of ICTs in Nursing classes and students' academic achievement.

	Value	Df	Asymptotic significance (bilateral)
Pearson's Chi-squared	9.478	2	.009
Likelihood ratio	10.609	2	.005
Linear by linear association	8.301	1	.004
N of valid cases	198		

Table 11: Results of Chi squared test for satisfaction with the use of ICTs in an educational setting and academic achievement.

Sample description

The percentage distribution by student gender (graph 7) shows that 73% of participants were women, 25% were men and 2% did not answer.

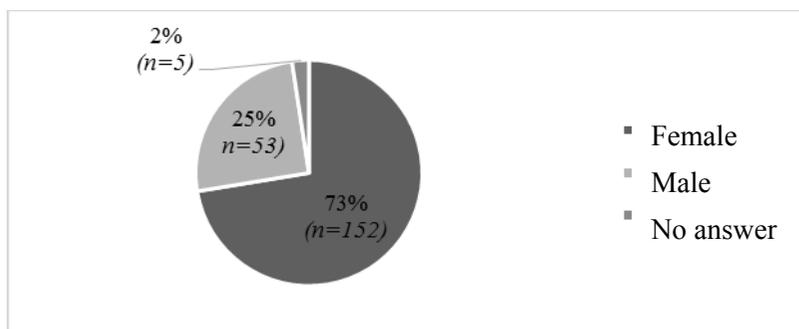


Figure 7. Percentage distribution of students by gender.

As regards the civil status of students at the moment of the investigation, as shown in graph 8, 90.5% indicated being single while 6.7% indicated being married. Only 0.5% of participants indicated another civil status and 2.4% did not answer.

As regards age groups, as shown in graph 9, 76.7% of participants indicating being between 18 and 21 years old at the moment of questionnaire administration and 13.3% between 22 and 25 years old. The lowest concentration of students was seen among those 26 years or older with 7.6%. 2.4% of students did not answer.

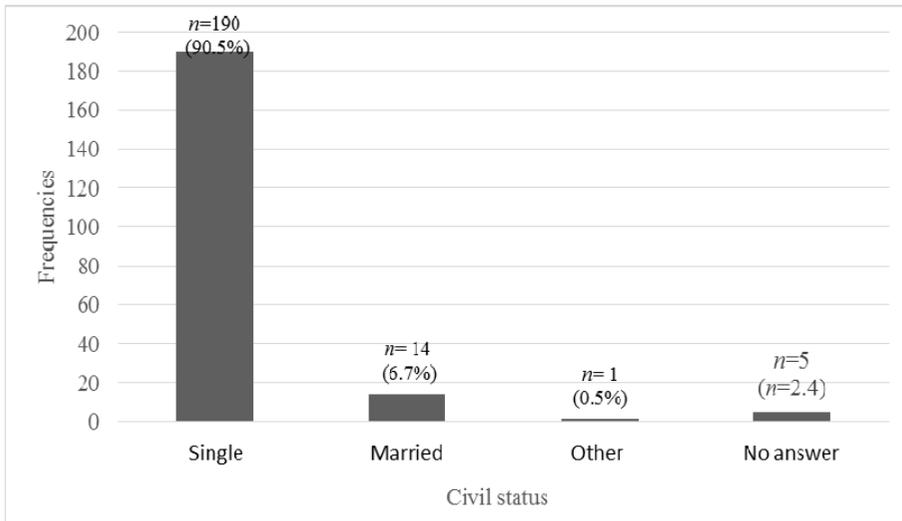


Figure 8. Distribution of students by civil status.

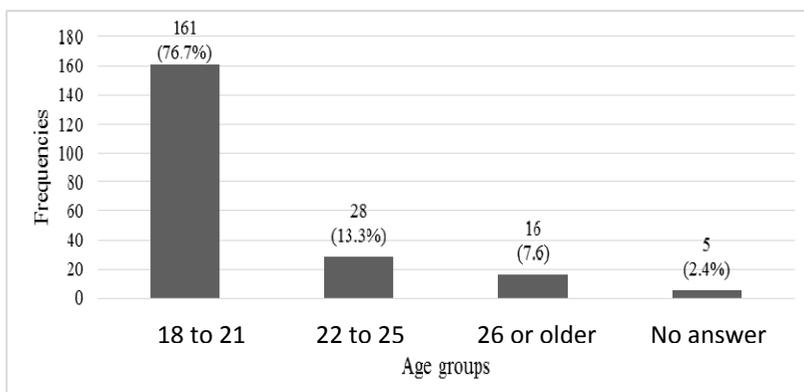


Figure 9. Distribution of students by age group.

Regarding the Nursing program in which the participants were enrolled at the time of the study (figure 10), 96.2% ($n=202$) is enrolled in a bachelor's program, 2% ($n=3$) in an associate degree program and 2.45% ($n=5$) did not answer.

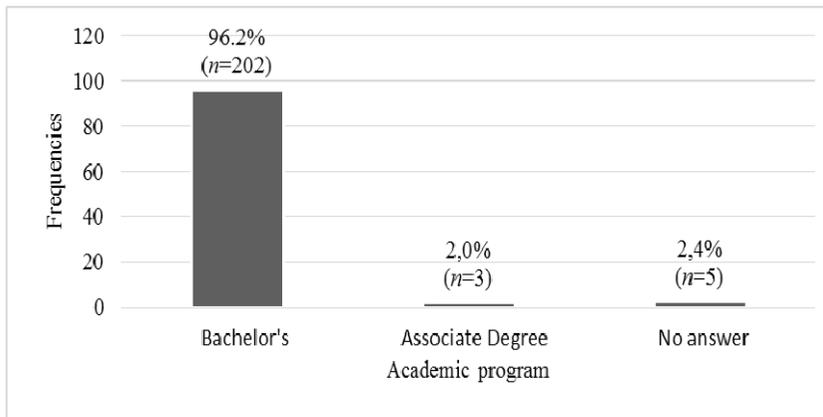


Figure 10. Percentage distribution of students by enrolled Nursing program.

81% of students indicated being in a daytime program, 16% in a nighttime program and 3% did not answer (figure 11).

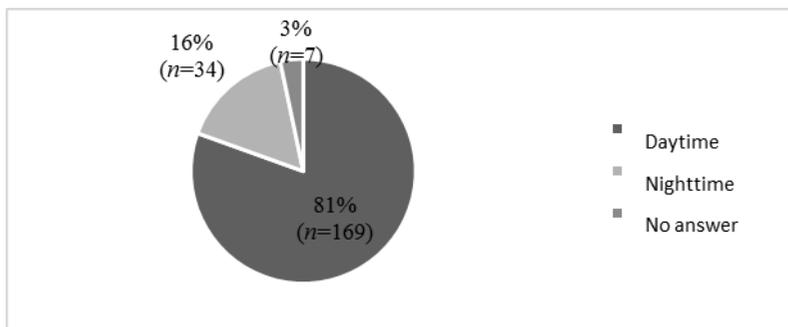


Figure 11. Percentage distribution of students by program schedule.

Regarding annual family income, as seen in graph 12, 59% of students indicated earning less than \$20,000, 21.4% between \$20,001 and \$40,000, 6.7% between \$40,001 and \$60,000, and the lowest number (2.9%) was seen for an income higher than \$60,000. 10% of participants did not answer.

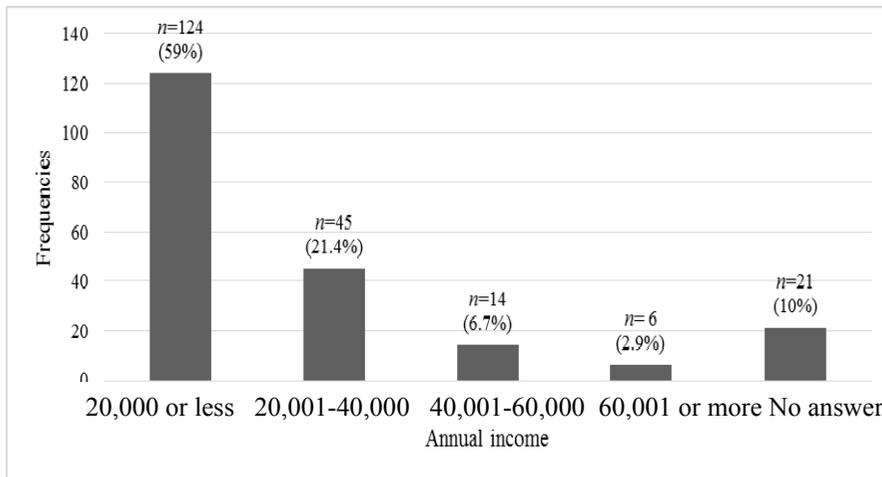


Figure 12. *Distribution of students by annual family income.*

Regarding students' place of residence, graph 13 shows that 58% came from an urban zone and 38% from a rural area. 4% of the students did not answer.

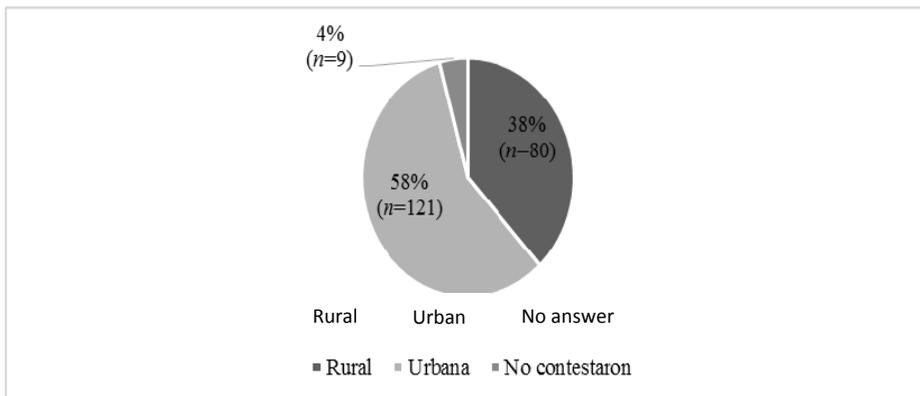


Figure 13. *Percentage distribution of students by place of residence.*

Graph 14 shows the employment status of the participants. 41.9% indicated they did not work at the time of questionnaire administration, while 40.5% had a part-time job and 12.9% had a full-time job. 4.8% of students did not answer.

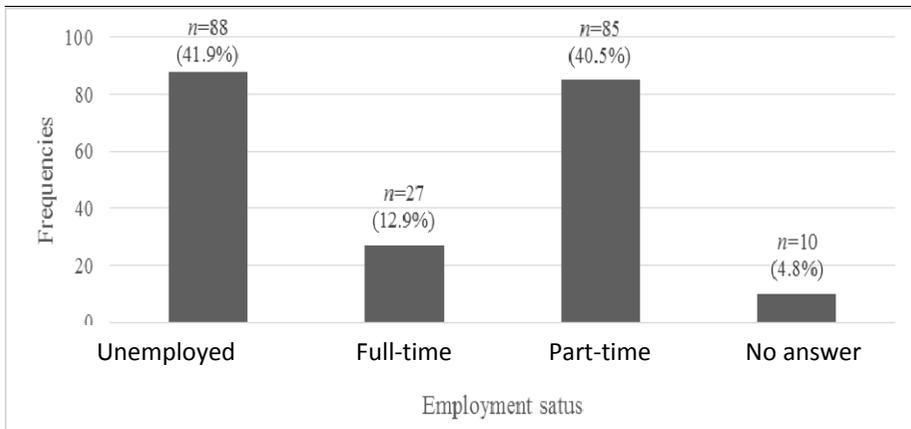


Figure 14. Percentage distribution of students by employment status.

Figure 16 shows the percentage distribution of students with and without children at the time of the investigation. 83% indicated having no children and 12% indicated having one or more child. 10% of participants did not answer.

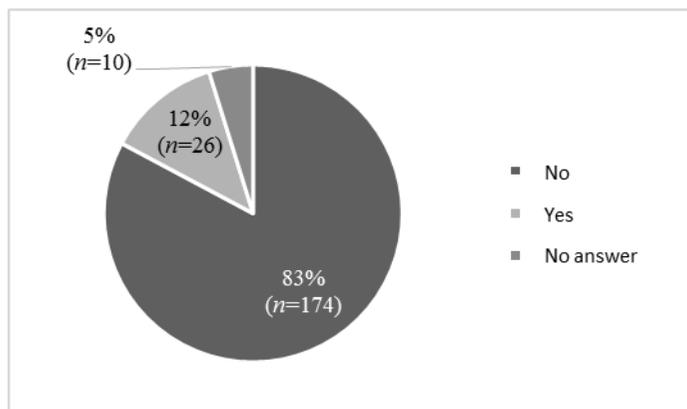


Figure 15. Percentage distribution of students with or without children.

Regarding the means by which participants acquired the 12th grade diploma, graph 17 shows that 62.4% acquired the diploma at a public school and 28.1% at a private school. The lowest numbers were seen for equivalence tests (1%), homeschooling (0.5%) and other means (1.9%). 6.2% of students did not answer.

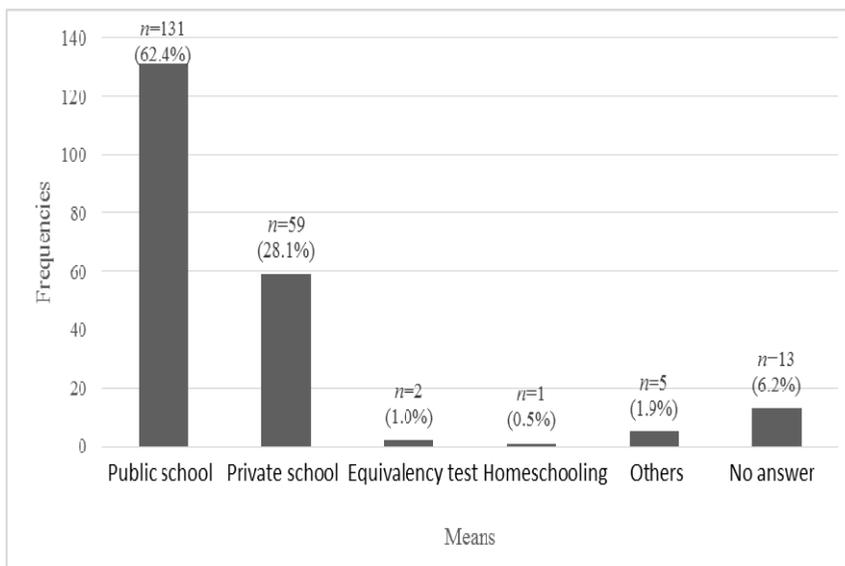


Figure 16. *Distribution of students by 12th grade diploma acquisition means.*

Figure 17 shows the distribution of students who had taken online or distance classes. 77% of students indicated they had while 18% said they had not. 5% of students did not answer.

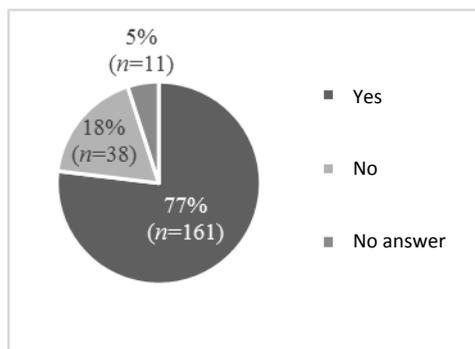


Figure 17. *Percentage distribution of students who had taken online or distance classes.*

As shown in graph 18, 87% of students indicated mastering the technical and operational language of their computer and only 7% indicated they did not. 6% of students did not answer.

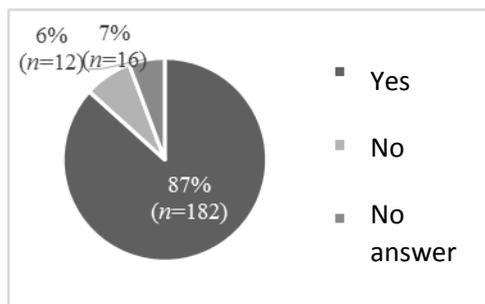


Figure 18. Percentage distribution of students who control the technical and operational language of their computer.

According to the information presented in graph 20, 56.2% of students indicated having a B average between 2.50 and 3.49. 30% indicated having an A average of 3.50 or higher. The lowest proportions were seen for C averages between 2.49 and 1.60 and D between 0.80-1.59, with 8.1% and 0.5%, respectively. 5.2% of participants did not answer.

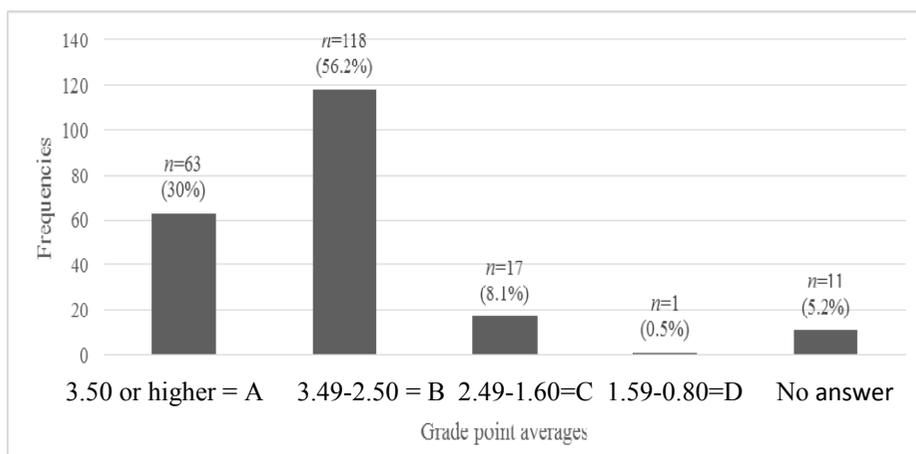


Figure 19. Distribution of students by grade point average interval.

4. Discussion and conclusions

We will continue the discussion and conclusions with regard to the objectives of our investigation. As for objective 1, identify the technological tools most often used by students, the most frequent service was Social Networks with 40.9%, followed by Various (e-mails, chats, forums, search engines and social network) with 35.6%. With regard to computer application and programs, students expressed having a high amount of knowledge of the

Internet with 90.5%, of presentations with 81.8% and with word processors with 67.6%. Students expressed having little knowledge with regard to academic databases with just 39.6%, and with spreadsheets with 37.1%. As for objective 2, establishing degree of students' satisfaction as regards ICT use, Nursing students in their first year of studies generally expressed being satisfied with the use of ICTs. Students expressed greater satisfaction with the use of ICTs in Nursing classes. The most significant data was seen with simulation centers with 80%, biomedical equipment with 79%, satisfaction with virtual simulation with 70%, followed by exposure to electronic records with 66%. Results measuring the degree of students' satisfaction as regards ICTs in an educational setting were compared. The perception of students as relates to the integration of ICTs in their general courses can be observed. Among the 22 statements, two of them reflected a significantly high percentage. 91% agreed that the Internet can be used as a teaching tool and that it favors the use of other languages.

Regarding the third objective, determine whether there is a relationship with students' academic achievement, we can see a relationship between satisfaction with ICTs in Nursing classes and students' academic achievement. 90.3% of students with a grade point average of 3.50 or higher expressed being satisfied, while 71.2% of students with an average of 2.50 to 3.49 expressed being satisfied. Generally speaking, participants had an average between 2.50 and 3.50 or higher. 56.2% had an average between 2.50 and 3.49, while 30% had an average of 3.50 or higher. As regards the percentage of participants who master the technical and operational language of their computer, 87% of participants indicated doing so, which can be associated with the amount of students who expressed satisfaction.

As regards the fourth objective, analyzing the support received by Nursing students for ICT use during first year of university studies, Nursing students enrolled in the studied university receive classes for integration into college life as well as basic classes on technical language as part of their curriculum. The studied university's goals include good use of information as part of expected competencies and results. Nursing alumni will face great challenges with technological innovation in the work field. Therefore, Nursing professionals must master the technical language in order to manage the electronic records of Puerto Rico's health system in compliance with Law Number 40 of February 2, 2012 for the Administration and Exchange of Electronic Information of Puerto Rico.

We would like to highlight that none of the sociodemographic variables presented in our investigation limited participants' ability to express their experience with ICT use. No correlation was observed in this investigation with the sociodemographic information, that is to say gender, civil status, age, annual family income, place of residence, employment status and amount of children, and degree of satisfaction with ICT use. 100% of students reported

being familiarized with the Internet. 41.9% of participants became familiarized with the Internet through school, followed by through friends with 22.4%. The studied population was able to describe their experience with ICTs in this research project.

4.1. Limitations of the study

A difficulty we solved entailed adjusting the thesis proposal to two different writing models, European and American. However, we managed to comply with the requirements of both jurisdictions.

4.2. Recommendations

We consider that our investigation should be replicated with Nursing students in their second, third and fourth year of study within the Nursing program in order to gauge the needs of these groups and compare the results with those of our investigation. Moreover, we propose the following recommendations:

- Offer training to professors as well as Nursing students on the latest tendencies of Information and communication technology (ICTs).
- Include a uniform guide in all Nursing curricula to help students and professors search for information through their institution's databases.
- Encourage evidence-based practice starting at the initial Health Science classes until culmination of the academic degree.
- Train Nursing faculty members through face-to-face workshops on the use of the most commonly used technological tools by Nursing students and how to integrate these tools in classes as part of teaching strategies.
- Establish a list of minimum skills for information and communication competencies within Nursing. This will help Nursing alumni in their immersion to the workforce, which requires a base amount of technical language know-how.
- Develop a guide for information search based on the competencies of the Nursing program for health sciences professors.

4.3. Prospective

After analyzing the findings of our study, we conclude that this investigation not only helps the studied community identify their degree of satisfaction as regards the integration of ICTs in their classes, but also contributes to the general population given that, once universities adopt the recommendations proposed in this paper, Nursing alumni will have the opportunity to acquire the necessary information competencies for their immersion into the workforce, and they will be able to easily master relevant technical language.

On the other hand, our investigation will help Nursing alumni approach current challenges within the health field and ensure patients are more informed and demanding with regard to their health conditions, becoming con-

sumers of digital information. At the level of society as a whole, this investigation contributes to ensure the community in general receives evidence-based treatment and the most up-to-date information on their treatments.

We propose future investigation of the following topics: 1. Nursing professors' degree of knowledge of ICTs as learning strategies in their classes; 2. Level of knowledge of ICTs by Nursing professionals and their degree of satisfaction with electronic record engagement; 3. Identification of the most common learning styles in different generational groups (Millennials, Generation X and Baby Boomers) within the Nursing Sciences program; and 4. Degree of adaptation of Nursing professionals as regards electronic records in a clinical setting.

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Exploring Gender Differences in Graduation Proficiency in Mathematics Education Using a Markov Chain Model: Implications for Economic Growth in Nigeria

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Abstract: This study employs an ex-post facto research design to explore the fluctuations of gender difference in academic achievement among graduating students of mathematics education. Graduation statistics for a total of 1106 graduating students of mathematics education (923 males and 183 females) from a University in North Central Nigeria were used to design a discrete-time Markov chain model for the movement of the difference (d) in graduating proficiency from one range of values (states) to the other. Additional goodness of fit test ($\chi^2 = 1.731$, $p = 0.99924$) and t-test ($t = 0.4055$, $p = 0.6852$) unveiled that d has stayed much the same over the 12 graduation cycles used in the study, and that whatever factors determine the difference in academic achievement between male and female graduating students of mathematics education on a graduation cycle basis have remained much the same over the years. Further analysis of the model predicted the closure of the observed gender gap in the next 15 graduation cycles (p^{15}). The results of this study has specifically highlighted the fact that female graduates of mathematics education are as proficient as their male counterparts in driving value added services in and beyond the education sub-sector of the Nigerian economy. Based on the findings of this study, it was recommended that future work may consider an in-depth investigation of the sensitivity of parameters that may have influenced specific probabilities given in the model.

Key-words: Mathematics Education, Graduation Proficiency, Markov Model, Gender Difference, Economic Growth.

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1. Introduction

Mathematics education as a field of study is concerned with the tools, methods and approaches that facilitate the practice of teaching and learning mathematics. Mathematics education, particularly at the higher education level, prepares students for quantitative and symbolic reasoning and advanced mathematical skills through general education, services, major and graduate programmes. Odili (2012) argued that the mathematics educator is concerned with curriculum development, instructional development and the pedagogy of mathematics. Mathematics education basically prepares students to become innovative mathematics instructors, professionally prepared to communicate mathematics to learners at all levels.

Concern for the role of mathematics education in the overall well-being of nations was at its climax at the formulation of the Education for All (EFA) initiative at the onset of the millennium. The EFA efforts considered mathematics education as a human right, a means of fostering creativity and change, that is, propelling learners into the unknown (Haddad & Draxler, 2002). In this regard, the National Universities Commission – NUC (2007) affirmed that mathematics education programme must seek:

- i. The acquisition, development and inculcation of the proper value-orientation for the survival of the individual and the society.
- ii. The development of the intellectual capacities of individuals to understand and appreciate their environments.
- iii. The acquisition of both physical and intellectual skills which will enable individuals to develop into useful members of the community.
- iv. The acquisition of an objective view of local and external environments.

On the basis of these articulations, Nigerian universities are to produce mathematics teachers with the knowledge, skills and attitudes which will enable them to contribute to the growth and development of their communities in particular and their nation in general. Mathematics education programmes are to encourage the spirit of enquiry, creativity and entrepreneurship in teachers, and to enhance the skills of teachers in contributing to the economic growth of the country (Abah, 2016). The extent of attainment of these targets is measured by the proficiency of graduates a mathematics education programme is turning out in each cycle.

Graduation proficiency refers to the quality of lifestyle, skills and content knowledge that higher education graduates exit the educational system with. A proficient graduate of mathematics education has passion for scholarship, originality and the ability to make creative decisions. The hallmarks of proficiency are intellectual curiosity, ability to work independently and in teams, and a high level of personal motivation. These

qualities are manifested when graduates possess the kind of professional and lifelong learning skills that they require to be successful in their jobs (Pitan, 2016). This is to say that they are able to bring their education to bear in their daily experiences (Francis, 2015). Proficiency, therefore, translates in acceptable character and learning.

Presently, the major indicator of character and learning at graduation is the Cumulative Grade Point Average (CGPA). Although, many may argue that proficiency in mathematics education is too complex to assert a fixed system of measurement (Grigorenko *et al.*, 2009), the graduation CGPA has come to stay as the classificatory factor of how good a graduate is. Research has shown that more than half of the time (57.4 %), graduation CGPA-based class of degree is used as the minimum entry criteria for recruitment in Nigeria (Adedeji & Oyebade, 2016). Evidently, graduating class of degree has become the single cause for worry for employers, prospective graduates and other stakeholders, particularly in mathematics education.

Consequently, the new vision for mathematics education recognizes graduation proficiency as key to achieving full employment and poverty eradication, with focus on access, equity and inclusion, quality, and learning outcomes. In terms of equity and access, not only has there been reports of disparity in enrollment statistics based on gender, cases of wide gaps in academic attainment abounds. Mukoro (2014) observed that there seems not to be comparative increase in enrollment rate of females as for the males over the years. This trend was attested to by Oloyede and Lawal (2008) who added that male graduates continued to exceed those of females at both undergraduate and post-graduate levels. With respect to academic performance, Oloyede and Lawal reported lower percentages for females in the distribution of best graduating students and award winners. This observable gender gap in achievement has also been given mixed treatment by some researchers. For instance, Afuwape and Oludipe (2008) after examining gender differences in achievement among Integrated Science students (126 male and 127 female) reported that gender gap in academic attainment could be disappearing. The point of certainty in reports of studies of achievement with respect to gender, as gleaned from available literature, is the presence of fluctuations (Lindberg, Hyde, Petersen & Linn, 2010).

One of the surest ways to explain fluctuations in life situations, such as those observed in the gender gap in academic achievement, is to model the observable randomness as a Markov process. In the Markov process, named after A. A. Markov who began the study of this type of process in 1907, the outcome of a given experiment can affect the outcome of the next process, setting up a Markov chain. To specify a Markov chain, we define a set of states, $S = \{s_1, s_2, \dots, s_r\}$. The process starts in one of these states and move successively from one state to another. Each move is called a *step*. If the chain is currently in state s_i , then it moves to state s_j at the next step with a

probability denoted by p_{ij} , and this probability does not depend upon which states the chain was in before the current state. The type of Markov chain being considered is called the *discrete-time Markov chain*.

Mathematically, a discrete-time Markov chain is a family of random variables, $\{X_n, n \in \{0, 1, 2, \dots\}\}$ which satisfy the Markov property (Helbert, 2015). In other words,

$$Prob\{X_{n+1} = j | X_0 = x_0, \dots, X_{n-1} = x_{n-1}, X_n = i\} = Prob\{X_{n+1} = j | X_n = i\} \quad (1)$$

The discrete-time Markov chain was chosen for this study is suited for modelling the fluctuation in academic achievement based on gender because transitioning of this occurrence happens at discrete times, namely at each graduation cycle. Helbert (2015) observed that some of the advantages of using discrete-time Markov chain model are that they are relatively easy to derive from successive data, it does not require deep insight into the reasons for the change but can give insight into the process, and the results from a Markov chain model are easily interpretable.

Based on (1), the probabilities p_{ij} are called transition probabilities. The transition probabilities $\{p_{ij}\}$ form the transition probability matrix, P :

$$\begin{pmatrix} p_{00} & p_{01} & p_{02} & \dots & \dots \\ p_{10} & p_{11} & p_{12} & \dots & \dots \\ p_{20} & p_{21} & p_{22} & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \end{pmatrix}$$

The $\{p_{ij}\}$ have the properties:

$$p_{ij} \geq 0, \quad \text{all } i, j$$

$$\text{and } \sum p_{ij} = 1, \quad \text{all } i, j$$

2. Objectives of the Study

This study seek to explore gender differences in exiting CGPAs of graduating students of Mathematics Education using a discrete-time Markov chain model. Specifically, the study seek to:

- i. Present mean differences (d) in graduation proficiencies between male and female graduating students of Mathematics Education.
- ii. Define the finite states for the movement of the difference (d) in graduation proficiency.

- iii. Generate the discrete-time Markov chain model for the movement of d over the graduation cycles along with the transition probabilities.
- iv. Predict, based on the model, the graduation cycle in which the gap in achievement between male and female graduating students of Mathematics Education is expected to close.

3. Methods

This study adopts an ex-post facto research design. The ex-post facto design was considered appropriate for the study due to its scope of coverage in explaining existing relationships and developing trends. The data for this study come from the graduation statistics of exiting students of Mathematics Education programmes at a University in North Central Nigeria. The data covers a period of twelve (12) distinct graduation cycles. A graduation cycle occurs at the end of a semester in which there are students available for graduation. As such, out of the academic sessions considered in this study, four (4) contain single graduation cycles (i.e. only at the end of the second semester) while the other four (4) contain two graduation cycles (i.e. at the end of both first and second semesters). Exiting CGPAs of a total of 1106 graduating students, comprising 923 males and 183 females who successfully graduated between 2007 and 2015 from the Mathematics Education programmes offered by the university, were used in this study.

4. Results

The extracted data on difference in graduation proficiency between male and female graduating students of Mathematics Education is presented in Table 1. The graduation cycles covered the period between 2007/2008 academic session and 2014/2015 academic session. Sessions with two graduation cycles carry the letters “A” and “B”, where “A” indicates the first semester graduation cycle and “B” indicates the second semester graduation cycle.

Graduation Cycle	Difference in Graduation Proficiency (d)	Gender favoured in the Difference
07/08	0.52	Male
08/09	0.06	Male
09/10	0.14	Male
10/11	0.06	Male
11/12/A	0.08	Female
11/12/B	0.36	Female
12/13/A	0.08	Male
12/13/B	0.04	Male

13/14/A	0.29	Female
13/14/B	0.10	Female
14/15/A	0.35	Male
14/15/B	0.01	Female

Table 1: *Difference in Graduation Proficiencies of Male and Female Graduating Students of Mathematics Education*

The model of interest in this study defines five (5) finite *states* for the movement of the difference in graduation proficiency. This difference, represented as d , is observed as it transitions between the classes or states in Table 2. The state $0.40 \leq d \leq 0.50$ does not exist based on the available data set.

State	Range
s1	$0.01 \leq d \leq 0.10$
s2	$0.10 \leq d \leq 0.20$
s3	$0.20 \leq d \leq 0.30$
s4	$0.30 \leq d \leq 0.40$
s5	$0.50 \leq d \leq 0.60$

Table 2: *Transition States and d Classes*

A chi-square goodness of fit for d in Table 1 yields χ^2 value of 1.731 ($p = 0.99924$) which is greater than the critical χ^2 value ($\chi^2_{0.05,11} = 19.675$). This implies that from the set of observed differences in graduation proficiency, there is insufficient evidence to reject the null hypothesis that d is not any different from an equal difference in academic achievement based on gender each graduation cycle. There is a considerable chance of Type II error here, the error of failing to reject the null hypothesis when it is not correct. It is obvious that the difference in graduation CGPA is not equal for each of these 12 graduation cycles and as a result, the null hypothesis is not exactly correct. What the chi-square goodness of fit test shows is that there is *little difference* between the fluctuations in the difference in academic achievement according to gender and an assumption that there was no change in this difference (d) each graduation cycle. What might be concluded then is that d has stayed much the same over these 12 graduation cycles and that whatever factors determine the difference in academic achievement between male and female graduating students on a graduation cycle basis have remained much the same over these years.

Despite the outcome of the goodness of fit test, the model of interest is still relevant on the ground that a certain degree of random fluctuation in d over a period of time is bound to take place even if the basic factors determining this difference does not change. In the traditions of Moody and DuCloux (2014), this stochastic process of counting the movement of d results in the

relative frequency of times d began in a particular state and transitioned to each of the other states. Therefore, the transition probability can be defined by

$$P_{ij} = \frac{n_{ij}}{\sum_{j=1}^5 n_{ij}} \quad (3)$$

Literally, (3) is obtained as the number of times d in state i transitioned to state j , divided by the total number of times d was in state i . For simplification purpose, the total number of times d was in each of the states can be observed as displayed in Table 3.

State	Items (d) in state	Total number of times in state
s1	0.01, 0.04, 0.06, 0.06, 0.08, 0.08	6
s2	0.10, 0.14	2
s3	0.29	1
s4	0.35, 0.36	2
s5	0.52	1

Table 3: Items in each state

Using Tables 1 and 3 side by side, it is quite easy to see that d transitioned from s_1 back to s_1 twice (i.e. 10/11 to 11/12/A and 12/12/A to 12/13/B), yielding a p_{11} of $\frac{2}{6}$. Similarly, d transitioned from s_1 to s_3 once (12/13/B to 13/14/A), giving rise to the transition probability $p_{13} = \frac{1}{6}$. Continuing with this pattern across the twelve (12) graduation cycles for the five (5) defined states will yield the transition matrix P .

$$P = \begin{pmatrix} 0.333 & 0.167 & 0.167 & 0.333 & 0 \\ 0.5 & 0 & 0 & 0.5 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \end{pmatrix} \quad (4)$$

From P , it can be observed that the probability of d transitioning from the range 0.10 – 0.20 to 0.01 – 0.50 is 0.5. This implies that half of the time, a difference in CGPA between male and female graduating students of Mathematics Education in the region 0.10 – 0.20 is set to reduce to the region of 0.01 – 0.10.

Having established the transition matrix P for the discrete-time Markov chain model of the gender difference in graduation proficiency among graduating students of Mathematics Education, it is possible to determine the behaviour of the chain after n steps. In this type of model, the ij th entry of $P_{ij}^{(n)}$ of the matrix P^n gives the probability that the Markov chain starting in state s_i ,

will be in state s_j after n steps. The implication of this property is that eventually, the successive probabilities stabilize or reach an equilibrium state and converge over time (Moody & DuCloux, 2014). Also, if a steady state can be reached for P after a particular power of P , it can be interpreted that the existing difference (d) will close after the particular number of steps. In this model under consideration, a power of P resulting in equilibrium will indicate the graduation cycle in which the gap in achievement between male and female graduating students of Mathematics Education is expected to close.

An application software, Microsoft Mathematics (© 2010 Microsoft Corporation, Version: 4.0.1108.0000), was used to generate successive powers of P in quest for equilibrium. Around the 10th power, the transition probabilities tend to converge, with little variations. However, at P^{15} , equilibrium was attained for P . P^{15} correct to four decimal places is given in (5). This steady-state matrix has all its rows the same.

$$P^{15} = \begin{pmatrix} 0.4997 & 0.1669 & 0.0835 & 0.2499 & 0 \\ 0.4997 & 0.1669 & 0.0835 & 0.2499 & 0 \\ 0.4997 & 0.1669 & 0.0835 & 0.2499 & 0 \\ 0.4997 & 0.1669 & 0.0835 & 0.2499 & 0 \\ 0.4997 & 0.1669 & 0.0835 & 0.2499 & 0 \end{pmatrix} \quad (5)$$

From (5), it is clear that after fifteen (15) graduation cycles, the predictions about d are independent of the value of d at the close of the 2014/2015 academic session, pointing to a close in the gap in academic achievement between male and female graduating students of Mathematics Education. Consequently, this information translates to a closure in gender difference in achievement within the next eight (8) years at the rate of two graduation cycles per year.

To verify this result, an independent samples t-test (equal variance assumed) was carried out on the raw data (graduation CGPA) of the 923 male and 183 female graduating students of Mathematics Education. The outcome of the t-test was not significant at 0.05 level of significance, as shown in Table 4.

Gender	n	Df	t-stat	t-crit	p - value
Male	923	1104	0.4055	1.9621	0.6852
Female	183				

$\alpha = 0.05$

Table 4: *T-test of Exiting CGPA of Male and Female Graduating Students of Mathematics Education*

The results in Table 4 indicate that generally, the observed difference in academic performance between male and female graduating students of

Mathematics Education is statistically not significant ($p = 0.6852$), affirming the possibility of near or total disappearance of such difference in the future.

5. Discussion and Implications for Economic Growth in Nigeria

Gender is a complex dynamic force that affects every social interaction, including interactions in educational and job settings. Gender inequality in learning mathematics and science has continued to be a topical issue of global concern, with no clear cut answer as to academic disparities between male and female students (Halpern *et al.*, 2007). This disparity translates into glaring difference in consideration within the labour market. Gender division in labour refers to the organization of labour on the assumption that men perform specific roles such as those of providers and breadwinners in the productive or wage labour sector outside the home, and that women provide domestic labour as housewives within the home (Association of African Universities, 2006).

Women made up a little over half the world's population but their contribution to measured economic activity, growth and well-being is far below its potential, with serious macroeconomic consequences. Female labour force participation has remained lower than male participation, women account for most unpaid work, and when women are employed in paid work, they are overrepresented in the informal sector and among the poor (Elborgh-Woytek *et al.*, 2013). This reality is more glaring in the field of Mathematics Education in which existing cultures around the world and particularly in Nigeria tend to create a situation of repeated priming of mathematics as negatively stereotyped on female students. This biased orientation, coupled with perceived difference in academic ability has dampened the chances of women in being employed in the field of practice and even outside the field.

However, Spelke (2005) held that in-depth studies yield little support to some stereotypical assertions, emphasizing that highly talented male and female students show equal abilities to learn mathematics. In the same vein, Iji, Abah and Anyor (2017) towed the line of Lindberg *et al.* (2010) in establishing that due to cultural shifts initiated by increasing levels of technology penetration in recent years, the gender gap is closing. This line of discovery is strongly supported by the results of this present study.

Current realities thrown up by the Nigerian economy has brought to the fore the call for sober reflection on a wide range of issues, including gender. To many, the dynamics playing out in the economy are the end products of unchecked profligacy and prolonged downgrading of cultural orientation (Abah, 2016). The prejudiced perspectives of employers of labour with respect to gender must change if the country must tap into the potentials of graduates of mathematics education. Apart from the skills of running a school plant, the training of the Mathematics Education graduate imbibes relevant qualities such as punctuality, honesty, hard work, smartness and innovation.

The strength of the graduate mathematics educationist lies in vital areas of communication, information technology, critical thinking, leadership, team working, problem solving and entrepreneurship. These attributes that are well sought after in government parastatals, private companies and firms across the country will be greatly missed if gender biases are permitted to pervade hiring decisions in the guise of academic proficiency. Young female graduates of mathematics education should be considered as work-ready individuals who are prepared to take decisions, act according to instruction, find opportunities, take initiative and produce results in their work places (Adedeji & Oyebade, 2016). This study has buttressed the fact that both male and female graduates of Mathematics Education must be treated fairly in the way they are adjudged competent for entrusted positions and contribution to economic development in Nigeria.

The outcome of this study underscores the possibility of closure of gender gaps in achievement among graduating students of Mathematics Education. A direct implication of this result is the realization of the provision of full human capacity for growth in all sectors of the economy. This study has specifically highlighted the existing equity in academic proficiency of graduates of Mathematics Education, underscoring the reality that female graduates are as proficient as their male counterparts in driving value-added services in and beyond the education sub-sector.

6. Conclusion

This study has attempted to explore the dynamism of difference in academic achievement of male and female graduating students of Mathematics Education. This was achieved via a discrete-time Markov chain model which attained stability after 15 graduation cycles, predicting a closure of the gender gap in the nearest future. The implications of this reality were discussed in line with the prospects for economic growth in Nigeria.

The data used for this study covers only twelve (12) graduation cycles and as such may be an inherent limitation of this work. Also, the study vaguely highlighted the presence of some constant factors moderating the difference in academic achievement of male and female graduating students of mathematics education without providing any insight on the extent of their influence.

Future considerations of this magnitude may seek graduation statistics across a wider span and location. Also, there is the need to investigate the sensitivity of parameters that may have influence specific transition probabilities given in the model.

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New Conceptual Perspectives in the Analysis of Social Vulnerabilities: the Local Advanced Marginality for the Sustainable Development of Global Citizenship

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Abstract: This article is limited to the field of social research by conducting a qualitative exploratory study in order to analyze the relationship between advanced marginality and the construction of social spaces, and its subsequent extrapolation applied to the advanced local marginalization to implement social cohesion and empowerment. For this purpose, we adapt the data interpretation technique of documentary content analysis of the scientific literature for a better understanding of this new perspective of social research.

Key Words: Urban Marginality, Poverty, Social Cohesion, Social Vulnerability, Social Spaces.

1. Human Development and New Risks to Social Cohesion

The current phenomena, such as globalization (Ortiz, 1997, Zolo, 2000, Stiglitz, 2015, Rampini, 2016, Pendenza, 2017), and mundialization (Sen, 1992; Giddens, 2001; Beck, 2000; Held and Mc Grew, 2001), may lead to a progressive dissolution of social cohesion, making it essential to rethink new instruments of social inquiry and, at the same time, new social policies (Archibugi, 2002, González, Bújanos and Rodríguez, 2016). They have also caused, in agreement with Izquierdo, Escarbajal and Latorre (2016), economic and social changes, so dizzying and so difficult to digest by the great majority of the populations that have increased the poverty, the vulnerability, and the

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social exclusion in spaces, groups, and people, unthinkable decades ago. In the European space, there has been an increase in unemployment, labor instability, generating a cohort of precarious workers, inducing them to abandon their traditional life systems for other more insecure, unstable and irregular social alternatives (Stiglitz, 2003; Escarbajal, 2010).

Consequently, a society impregnated with a diffuse crisis in the socio-economic and political spheres is constituted by individuals for whom the possibilities of personal and social development, and even survival, are at stake (Garcia and Cruz, 2010). And, therefore, social welfare –that system of rules with which the State seeks to eliminate social and economic inequalities between citizens and which proposes to offer and guarantee services considered essential by a decent standard of living– has entered into crisis, from the 1980s and 1990s, as a consequence of profound economic, political, social, and cultural changes (Ferrera, 1993, Huber, Stephen, 2001, and Pisarello, 2007, Serrano, 2014, UN, 2015, Bifulco, 2015, Gómez Galán, 2016; Actionaid, 2016).

In this sense, the Welfare crisis has been mainly due to the appearance of new risks: such as the protective capacity of employment, the differentiation in the family structure, and the diversification of the social demand; productive decentralization, flexibility of work relations, and differentiated consumption; family instability and the crisis of the nuclear family; demographic changes; such as the aging of the population; the redefinition of women's rights; migration flows; The end of full occupation and job insecurity (Bertin, 2009, Bernardoni, Fazzi and Picciotti, 2011, Del Forno, 2016).

In the time of over-modernity (Augé, 2013), the social sciences have as a new challenge a particularly complex responsibility: to analyze a reality so voluble and changing, whose only possible definition seems, paradoxically, to be non-definitional (Bauman, 2008).

The lack of social cohesion has thus become a dimension and structural product of our society. Social Sciences' important responsibility in the attempt to break down mechanisms of reproduction of inequalities is to identify, understand, and intervene in those dimensions of social contexts that produce it - by constructing symbolic, social and physical spaces that feed vulnerable conditions - to reconstruct spaces of Cohesion by recognizing the partisan links of politics, economics and society (Wacquant, 2008).

The word crisis in its etymological sense indicates a rupture, and indirectly and with a positive and constructive connotation, the need for action for change. Social action is conditioned by access to the definition of reality –that symbolic power to do (Bourdieu and Wacquant, 1992)– which influences the local production of social order (Bonolis, 2014).

In this sense, the present theoretical-reflective work aims to describe and analyze the effects of globalization on social cohesion and emphasize the need for a change in social intervention under auspices of the human devel-

opment paradigm in symbiosis with the new concept of local advanced marginality that from a polyhedral perspective allows the analysis of contexts of social vulnerabilities.

2. Social transformations and marginalized urban communities.

The city is defined as the main actor of the social dynamics that influence the production of the evident increase in the rates of failure of the political-economic system launched by post-Fordism and –specifically– of the welfare crisis understood as a practice of social protection of the citizen (Hurber and Stephen, 2001, Pierson, Castles and Naumann, 2014, Fondazione Zancan, 2015). The postmodern city became subject-object in the new definition of relation in the models: dominance of economic organization, territoriality and power distribution (Held, Mc Grew, 2001, Berger, Huntington, 2002 and Gonzalez, 2008). Under this urban prism the dynamics of globalization seem to be abandoning its role of integration mechanism and place of democratic relation (Abrahamson, 2004; Wacquant, 2006). Likewise, the great European cities are undergoing major transformations in the last decades. One of them has been the increase in social vulnerability and the weakening of community ties that have led to social differentiation and concentration of social disadvantages in certain parts of the city, with a high prevalence in peripheral neighborhoods (Paugman, 2007, Wacquant, 2008 and García y Cano, 2012). At the same time, evidence of processes of urban and residential segregation coupled with signs of school segregation sharpen the divisions and ethnic-racial tensions that occur mainly in disadvantaged neighborhoods (Cano, 2012). The outsiders, the inhabitants of the modern slum, become in the new context of globalization the precarious, urban underclass (Wilson, 1996; Sassen, 2016), those who because of a constant state of unemployment, or underemployment and isolation, suffer a condition of advanced marginality.

One can speak of a new class of subjects, the urban underclass, which lives in spatially isolated areas, whose difficult existence oscillates between unemployment and chronic underemployment. The difficulty in finding a stable job and isolation make the self-production process of exclusion grow in a closed circuit of poverty (Wilson, 1997; Gouverneur, 2007).

In the urban centers are registered the conceptualization of functions of control, of financial activities, and of an inter-crossing of the main networks of powers. On the one hand, the city has consolidated itself in the knowledge sector, which needs high levels of education, and on the other, the supply of precarious and low-profile work has grown (Sassen, 2004).

Additionally, the impact of neoliberalism is not only limited to the economic sphere, but has also had clear influences in the social, political and cultural spheres (Table 1).

Economic	<p>Public deficit and debt, fiscal imbalances and excessive public spending, along with the internationalization of production, financial flow, and the globalization of areas of specialization (Bernardoni, Fazzi and Picciotti, 2011), are decisive in the whole picture.</p> <p>The "destabilization of the stable" (Castells, 1997), which involves new actors, normally considered stable workers living in a state of floating (Sassen, 2004).</p>
Political	<p>Neoliberalism reduces the scope of democratic politics as the market pushes these values to the margin (Gonzalez, 2008).</p> <p>The triumph of speculative finance disarms politics and economics, dismantling societies (Touraine, 2010).</p> <p>The phenomenon of decentralization is presented as an attempt to resolve the inability of a state to sustain the pressure of social demands through a delegation of powers to sub-state territorial entities (Wacquant, 2006).</p> <p>The urban underclass (Wilson, 1997), which due to a permanent state of unemployment or underemployment and isolation, suffers a condition of advanced marginality (Wacquant, 2006), and the general crisis of welfare (Del Forno, 2016).</p>
Socio-cultural	<p>A hyper-individual world where community feeling, or obligations on the other hand, disappear (Cohen, 2011).</p> <p>Relationships are always made more instrumental and calculated (Weber, 2002).</p> <p>Surveillance, in the broadest sense, has expanded in all areas of life apart from the market (Garland, 2001, Wacquant, 2012).</p> <p>One of the paradoxes of late modernity is phenomena such as cultural pluralism and social complexity, there has been a shift of centrality from society and roles to subjects and the construction of identity (Giddens 2001).</p> <p>'Work' no longer represents a security element that allows us to fix definitions of the I, identities and projects of life (Bauman, 2003).</p> <p>Subjectivism- or individualism - expresses the consequence of a society of risk and uncertainty (Beck, 2000) and liquidity (Bauman, 2008).</p> <p>The contemporary disorientation derives, not only from the discredit to which the higher values have arrived and the decay of the meta-</p>

physical foundations of knowledge, of law, of power, but also of the disintegration of the most common and elementary social points of reference, provoked by a new organization of the world (Lipovetsky, 2006).

A diffuse risk that threatens the subject in "Each possibility of ascribing a social value to its own capacity" (Honneth and Fraser, 2003, p.23). The speed of development of rationality (Habermas, 1976) at the cost of human development (Nussbaum, 2012).

Table 1. *Main transformations related to globalization and mundialization.*

In Castells's (1997) line of argument, we can see a process of destabilization of the stable, which involves new actors normally considered stable workers living in a state of floating: there is a disruption of the life cycles that entail an increase in the risk of instability and social insertion outside of work, a de-socialization of the wage relation that involves the labor crisis as a social force integrating urban contexts.

The disappearance of the state in the life of the subject –through a precise policy of marginal inclusion policy– is one of the main causes of the generation of territories of depravity and abandonment, a dimension of exclusion that is legitimate both from the middle-high levels of society, and by those who live in these areas. The city, in this perspective, is creating spaces of discharges for subjects no longer useful and functional to the new dominant economic order, progressively relegation place for subjects in social decline, precarious and unemployed (Maurin, 2004; Wacquant, 2006).

In this social context, marginality appears, fueled by phenomena of labor and social decomposition, under the pressure of a tendency towards fragmentation rather than the union of subjects found in lower regions in social and urban space. Subjects that have a lower visibility are tending more to a reduction of levels of claim (Arriba, 2002; Astarita, 2009).

The new forms of domination and labor exploitation hitherto exposed briefly demonstrate the decline of the city as a place of social promotion.

The power structure has created, then, specific social spaces where – after the transition from welfare to workfare –a mechanism of disqualification of the capacities of the individuals– and of access and production of social capital – understood as the means with which they have to fulfill their various purposes in the exercise of their freedom. The concept of social capital allows us to articulate the relations between the conditions defined as the cause of the reproduction of marginality and the relationship with other agents of social space (state, social and economic policies) (Bourdieu 1990, Dur 1993 and 2000, Fukuyama, 2000, Santos, Montalbá and Moldes, 2004).

With this social conception, protagonism is returned to the subject (Hernández, 2010), and to the territory in the specificity of its local context, to analyze in a multidimensional way the vulnerabilities that challenge social

cohesion from the perspective of human development (Albuquerque, 1997, Nussbaum, 2011, Papalia, Feldman and Martorell, 2012).

In each metropolis of the first world, one or several municipalities, districts or concentrations of social housing, are known and recognized as urban hells where violence, vice or abandonment are but normality. Some even acquire the status of national incarnation of all evils and dangers. At the same time, the policies of some governments can aggravate the structural conditions of poverty by feeding mechanisms of violence, hunger and unemployment.

In a socio-reflexive effort it can be inferred that on some occasions the urban space, under the dynamics of globalization, seems to be abandoning its role of integration mechanism and place of democratic relation in symbiosis with new policies that, instead of including, tend to isolate (Wacquant, 2006, 2007a).

In summary, in the urban centers the conceptualization of functions of control, of financial activities, crossing of the main networks of powers is registered. On the one hand, the city has consolidated itself in the knowledge sector, which needs high levels of education (Ponce, Pagán and Gómez Galán, 2016), and on the other, the supply of precarious and low-profile work has grown (Sassen, 2004). In this sense, Paugman (2007) refers to it as the process of spatial disqualification, concept of vicious circuits (Mingione, 2004), or ultimately, advanced marginality (Wacquant, 2001, 2006, 2010, 2013 and 2015).

3. New Conceptual Perspectives in the Analysis of Social Vulnerabilities: Marginality.

In light of these dynamics, the need arises to adapt the dimensions of conceptual analysis as an essential budget to solve current problems and to understand them in their complexity (García and Cruz, 2010).

Recent studies show that economic development has not reduced the level of poverty or exclusion (García Lizana, 2008), supporting the view that economic growth is a necessary but not sufficient condition to overcome social vulnerabilities. Conversely, reducing the rate of exclusion is a necessary measure to generate more opportunities for economic development: vulnerabilities are not simply a revenue product, but are connected to the "health" of the environment in which the individual - with their networks - lives (Castells, 1997, Subirats, 2001, García and Cruz, 2010, Fraser, 2013).

In this research, in fact, one has preferred to use the concept of marginality in that it offers a change of perspective in the analysis of social cohesion, because it not only takes into account the explanatory dimension of the crisis in social cohesion, the "vulnerable" individuals within the social system. This meaning has been introduced –especially in the 50s and 80s– according to different perspectives: ecological-urban, cultural, economic or different com-

binations among these approaches (Germani, 1973, Castells, 1997, UNDP, 2003 and Stiglitz, 2012).

The term marginality shows that vulnerabilities are not only produced by an accumulation of economic fragility (in participation in production and consumption), but also in politics (political and social citizenship) and social (absence of social ties and relations, social perversion) (García Lizana, 2008).

In this sense, the concept of marginality also highlights the lack of integration of groups that are not excluded from the global society, but which occupy an unfavorable position. Recognizing the situation of marginality as a way of occupying a role in the system breaks the margin-center perspective, considering subjects within and not outside the system (D'Amato and Porro, 1985).

At the end of the 1960s, the Center for Latin American Economic and Social Development (Deseal) pointed to the following dimensions of this term: the ecological dimension (circle of localized marginality); the socio-psychological dimension (lack of participation in the benefits and resources).

Social, in social networks, their groups lack internal integration); the sociocultural dimension (living standards, health, housing, educational and cultural); economic dimension (the marginal are considered sub-proletariat because they have subsistence and informal jobs); (they do not participate, they do not have political organizations that represent them or take part in the tasks and responsibilities that must be undertaken to solve social problems) (Vekemans and Giusti, 1969).

Also, a study of the factors of marginality can be referred to the dimensions used in the studies of exclusion, but not forgetting the different perspective: they are not dimensions of broken links but subject to vulnerability (Table 2).

Axes	Dimensions	Aspects
Economic	Participation in production Participation in consumption	Exclusion of the normalized wage relation Economic Poverty Deprivation
Political	Political citizenship Social citizenship	Effective Access to Political Rights Abstention and political passivity Limited access to protection systems Social: health, housing and education

Social-Relational	Absence of social ties	Social isolation, lack of social support (relational)
	Social relations "perverse"	Integration in "deviant" social networks Social Conflict (anomic behaviors) and family

Table 2. *The three axes of social vulnerability. VI Report on exclusion and social development in Spain.* Source: Table, 3.2., p.208 (FOESSA, 2008).

The analysis of marginality can not only take into account the question of income, but also the process of reintegration in the social structure and the balance in the networks of social relations.

Social marginality reflects the idea that the organization of society is not only based on inequality in terms of access to social rewards or hierarchy of social positions (as assumed, for example, from theories of social stratification), but also the existence of different degrees of social integration. The marginal individual is the one who is far from the center of the social system to which he belongs, and is next to the boundaries that separate the system from the outside. The notion refers, on the one hand, to the existence of a limit that separates the system from the environment - or different systems between them - and on the other hand the existence of different degrees of integration within those limits (Ranci, 2002, Zamagni, 2007, Alonso, 2012).

It is also embedded in the productive structure of society; It is for this reason that marginality must be understood as a structural, functional and stable phenomenon of capitalist societies, by virtue of which an important sector of the population is at the margin or in the margin of the social system without being able to fully enjoy the benefits which generates social wealth such as education, housing, health, etc. (Castells, 2010).

Another important contribution that enriches this concept is the so-called social disqualification. The disqualified are those who live in an extremely precarious condition and therefore are situated outside social exclusion, which only social support from the institutions can solve (Gallie and Paugman, 2000).

Marginality, being a non-contingent but structural factor of our time, has to contemplate a social treatment of risk of exclusion not only among the excluded but in society as a whole, and in its dimensions. Although precariousness is one of the factors that produces marginality, thinking of a policy of insertion, by itself, does not lead to a reduction of inequalities or exclusion. Labor insertion cannot be a state but a stage, a necessary element, but not sufficient to realize the well-being of people. A policy of coercion between politics and economics is needed (Laville, 2015).

Equally, this is a dynamic and contextual concept, related to the contingent socio-economic conditions. The weak groups of societies are no longer

individualized in relation to the traditional concept that evidenced a personal deficit of the subject. The emergence in society of new marginal people are the result of demands of hyper-competitiveness accompanied by a drastic reduction of traditional jobs, which transform it into non-functional to the development of the current economic system. "Some people (no matter how terrible it is to just write it) simply do not work: the economy can develop without their contribution; On any side that we want to consider, for the remaining part of society, these are not a benefit, but a cost "(Dahrendorf, 1995, p.36, a.t.).

The growing marginality in our society (Wacquant, 2006) is reflected in a low level of social cohesion and integration (D'Amato, 1985), and affects individuals and groups that no longer find space in terms of a rational organization of society.

In this sense, it can be understood as the condition of vulnerability that puts the individual at the border between cohesion and exclusion: there is a thin line separating the social bond that precedes its rupture and the exclusion zone.

The three different areas of social cohesion are interconnected in relation to the occupational and relational insertion positions: an area of social integration, one of vulnerability, and one of exclusion (*désaffiliation*). This taxonomy must be understood not as impermeable shelves between them, but as a possible dynamics conditioned by ongoing social processes, characterized by the drift of the regime of Fordist accumulation and its regulative rules (Honneth and Fraser, 2003, Utting, 2015).

Marginality can be defined as the temporary state of having been brought into relative isolation, at the edge of a system (cultural, social, political or economic). Socio-economic marginality is a condition of the socio-spatial structure and the process in which the components of society and space in territorial units are observed, lag behind an expected level of performance in economic, political and social terms, which are compared with the average condition in the territory as a whole (Sommers et al., 1999; Brodwin, 2001, Davis, 2003, Leimgruber, 2004 and WWI, 2010).

Under this view, the phenomenon of marginalization is not only the result of a low income level, but a product of different forms of freedom, avoidable suffering, premature mortality, illiteracy, disease prevention, social exclusion and insecurity and denial of political freedom. Redistribution of income is only one aspect of the struggle against marginalization (Sen, 2000).

It is not possible to solve the problem of marginality as an automatic result of economic development, that is to say, through the more egalitarian distribution of income, but also to analyze the structurally disqualifying factors characteristic of social organization, reinforcing social and protective networks (Paugman, 2013).

Under this multidimensional perspective it is considered pertinent in the following lines that constitute this scientific study to explain its evolution towards the local advanced marginality.

In this sense, advanced marginality is a diffuse risk that threatens the subject in the possibility of linking a social value with his own capacity and his possibilities of personal development, which Castells (1997) defined as ascension of vulnerability.

4. Local Advanced Marginality: New Models of Social Cohesion.

In the light of current social transformations, it is necessary to introduce a conceptual framework that constitutes the narrative that determines the re-thinking of social policies (Paugam and Gallic, 2002, Piesteau, 2006; Goerlich Gisbert, 2009), and the evolutionary trend of the term marginality to the local level may be a new path for the sustainable development of global citizenship.

The increase of social, political and economic vulnerabilities, following the perspective of Local Human Development, makes one recognize the importance of curing dimensions such as social capital - and in the networks of relations according to a perspective of the subject - that occur in a specific urban context (Habermas, 1976, Bourdieu, 1990, Simmel, 1995, Putnam, 2002, Robeyns and Brighouse, 2010, Atkinson, 2016), and the territory understood as a resource and services, building new contexts of citizen empowerment, avoiding feeding marginal structural contexts.

From this social perspective, the term local advanced marginality seems functional insofar as it allows a change of perspective on the lack of social cohesion and the consequent intervention on the problem.

The concept introduced offers a more adequate potential compared to terms such as poverty and exclusion, taking into account the complexity of the current context and allows for a more effective and focused intervention on the real social problems:

1. The term Marginality allows a multi-dimensionality reading of the lack of social cohesion: it has to be evaluated not only in terms of poverty, but in terms of the three political, economic and relational axes.
2. Being that the lack of social cohesion, produced by different dimensions, is a process of accumulation of vulnerability and not a status of the subject: it will be fundamental to look at the relationship between subject and territory, it being useless to intervene only in the territory without taking into account the Subject and the reverse.
3. The term marginality puts the subject within and not outside the social system, leading us to define the lack of cohesion as a phenomenon not punctual but structural: we must think social poli-

cies extended to the entire social structure and not just a sector of it.

4. The marginality thus understood offers the recovery of the subject in its specific territory, promoting the need for social policies oriented to protection, but also to the freedoms and autonomies of citizens.

The current policy does not seem to be aimed at strengthening a democracy understood as an aspiration to happiness in freedom (Arendt, 2001), which is expressed, above all, through the possibility of individual action.

Democracy, in fact, should guide the implementation of a being that does not respond in terms of utility, but to the possibility of life and freedom. Freedom is not only immunity and independence, but above all, the possibility of action and choice in alternative combinations equally accessible to all. To offer what Sen defines as the capability (Sen, 1993; Artigas, 2001; SEDESOL, 2003; Concha, Ximena and others, 2001; Bebbington, Anthony, 2003), of implementing a mixture of rights and opportunities that can make the individual truly free.

The choice of the Human Development paradigm allows the investigation of marginality in its multidimensionality (García and Cruz, 2010). It transposes the economic question from the main element –almost monoexplanatory– of the phenomenon in one of the different factors that affect the process of vulnerability of the individuals. Well-being is represented by the active role of the person, in his free access to a good and his free choice (Robeyns and Brighouse, 2010).

From this perspective policies oriented to the well-being of the person need a change of perspective: it is not the person who has to adapt to the resources that the territory offers, but rather the resources have to be linked to the needs and capacities of the subject. The well-being of the people is not linked to the endowment of economic goods but to their capacities, as an individual and component of a given social network (Sen, 2000) that takes place in a specific territory (local space).

In fact, from a perspective that starts from the subject –and not the other way around–, and its protagonism, the strengthening of social capital can constitute a tool of confrontation of marginality in advance, through the recovery of urban social spaces (Bourdieu, 1990, Sen, 2007, Augé, 2009).

In the connection and proximity of the characteristics and values of space, and of the same relativity of time, social space is for Simmel (1995), a foundational dimension of society, place of the condition and symbol of the incessant flow of life in social forms in which individuals are recognized and through which their relationships are structured. The conditions and position of the subjects with respect to the social space in which they are located reveal the limits that regulate participation in collective activities (Simmel, 1995, Martí, 2002, Eyre De Lorenzo, 2016).

According to the reflections that have been made above, it can be inferred that the advanced marginality is the set of basic forms of disqualification of the capacities of the individuals - that is to say, of the means with which they count for accomplishing its diverse ends in the exercise of their freedom (Sen, 2007) and their happiness (Arendt, 2001) - the creation of social capital in a given social fabric - the local social space - becomes a tool to favor spaces of social cohesion (Castells, 1997; Vázquez Barquero, 2000), and in the literature (Carroll and Stanfield, 2003). Thus, the spatial dimension - in which historical factors, social practices and public policies converge - has, then, a great explanatory power on the particular dynamics of inclusion and social exclusion (Subirats, Gomà and Brugué, 2005).

From this social aspect, the problem of social well-being cannot be represented only by the economic capacity of the individual, but by its capacity, that is to say, its capacities, and is strongly connected to elements such as social capital and territory (Kumar-Giri 2000; Robeyns, 2003, Alexander 2008, Robeyns and Brighthouse, 2010).

In this sense, the problems of urban marginality –understood as a significant concentration of precariousness, immigrant population, official housing, low quality schools, situations of spatial and social isolation– lead to a deep sense of frustration and lack of expectations (Lagrande and Oberti, 2006: 243), is an increasingly visible element in socio-political agendas as they threaten to be chronic problems and to question traditional modes of citizenship (Lagrange and Oberti, 2006; Wacquant, 2007b; García y Cano, 2012).

Ultimately, we would like to close our reflection by indicating that local advanced marginality seems to be the term that best synthesizes the confluence of all these dynamics related to current transformations.

In order to break these mechanisms, it is essential to understand the phenomenon in its complexity, leading to the influence of the local dimension, as a producer of social order, and the urban dimension as a synthesis of the triangle of social space, symbolic and physical, in which the social reality is constructed and that constitutes the field of action and promotion of social change (Wacquant, 2008, Farías, 2017).

The term, in fact, makes it possible to show –among others– the structural relationship that is determined between the processes of capitalist accumulation and the increase of social inequalities; points out the fragmentation and precariousness of the socio-labor structure, and emphasizes the need to legitimize the presence of a surplus population component to guarantee the integration of the system (Salvia, 2012). In addition, with the connotation of "advanced" measures to highlight two other important aspects of the new poverties. On the one hand, the strong connection of the phenomenon –as already evidenced - with other effects of post-Fordist transformations in the most advanced sectors of the economy. On the other hand, it wants to show

how it is a typically urban phenomenon, and in continuous progress, and the need for public and social inclusion policies (Davis, 2006; Wacquant, 2006).

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Palliative Education of the Family in the Care of Terminal Patients: A Descriptive Correlational Study

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Abstract: Palliative care (PC) education is critical for proper practice and compassionate care. The training of health professionals in PC seems insufficient and of variable quality. Studies point towards the need for training of these professionals in PC. Several authors emphasize the need to develop communication skills consistent with PC quality standards. Secondary data comes from 370 adult oncology and non-oncologic patients in the terminal phase between July 2014 and June 2015. There is a statistically significant difference in 4 out of 21 criteria on education for patients and families: 1) Diagnosis, signs and symptoms, 2) Medical treatment, 3) Restrictions and, 4) Skin care. According to the results, nurses are more oriented to cancer patients than non-cancer patients.

Key-Words: Nursing Competencies, Palliative Care; Family Education; Continuing Education in Nursing, Quality of Life.

1. Introduction

Education in Palliative Care (PC) is considered critical for proper practice and compassionate care (Baker, 2005). Training of health professionals in PC has not been fully achieved and still shows variability in PC quality (Wenk, De Lima, Mutto, Berenguel, & Centeno, 2016). In studies about other

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perception of health professionals regarding PC knowledge, they concluded the need for training in this area (Basol, 2015, Meo, Hwang, & Morrison, 2011; Michelson, Ryan, Javanovic & Frader, 2009). Also, several authors emphasize the importance of training the first level professionals to acquire basic communication skills in accordance with the quality standards that patients with palliative needs deserve (Quinn, Hudson, Ashby & Thomas, 2008; Wenk et al. Wittenberg-Lyles, Goldsmith, Ferrel and Burchet, 2014). The health care team is an essential component to integrate the family in the provision of CP with the purpose of providing an optimal quality of life to the terminal patient (Astudillo, Mendinueta, & Granja, 2008). The family is a crucial element of PCs, so their education is extremely relevant (Araya, Guamán & Godoy, 2006).

Astudillo, Mendinueta, and Granja (2008) warn that it is important for the health care team to recognize both the family and the patient as part of the therapeutic triangle. The family is an essential part of the PC, so their education is extremely relevant (Rodríguez, Ruiz and Carvajal, 2007). The family can collaborate effectively and actively in the care of the patient and revert to the health care team the responsibility of educating adequately about the control of symptoms, postural changes and personal hygiene, among others (Araya, Guamán & Godoy, 2006).

According to Lolas (1994), in order to achieve collaboration between the family and other significant individuals, the health care team is useful in collecting certain data as to the way families face their lives and circumstances, be it their history, traditions, myths and theories about the illness that afflicts their loved one, as well as death, the data gathered by the health care team will facilitate the educational experience. In addition to providing the context that articulates the role of the PC team to prevent, as far as possible, situations of tension within the family and to assist in their resolution in the event that such situation emerges (Díaz, González, Silva & Zamora, 2012).

In this educational process, according to Ortega (2012), it is necessary to anticipate to the family relevant information related to the procedures in the framework of the disease process and the impact that the disease will have on marital, sexual and family relationships, as well as the factors that increase the stress in the family and their pain.

On the other hand, it is important to emphasize that when confronting the proximity of death the family could face certain fears that the health care team must take into consideration. These include fear of patient suffering, fear of talking to the patient, fear of being alone with the patient at the time of death or, contrariwise, being absent when the person dies, which impedes the need to rest and to carry out activities of a daily life (Monterola, 2010).

In another study conducted in Cuba, the researchers set out to identify the extent of education that the dependent elderly family receives in terms of attention and care. This was done through interviews before and after receiv-

ing treatment that consisted of lectures, demonstrations and family dynamics on the following topics: general characteristics of aging, general care of the prostrate elderly, dependent elderly quality of life, bio psychosocial rehabilitation, care of the caregiver, importance of family harmony in dependent patient care, how to improve attention and memory, attention to the elderly's social problems, and adequate nutrition for dependent patients.

The study results point out the importance of guiding or educating the family of older adults, since in the initial interview, 100 percent of the participants demonstrated inadequate knowledge in contrast to the exit interview in which 85 percent of the participants demonstrated adequate knowledge about patient and caregiver care (Caballero, Naranjo & Fong, 2002).

The communication in PC goes further than the words and the content, since it contemplates attentive listening, the gaze and the posture, so that a humane guided assistance can be obtained. Adequate use of this resource is a proven therapeutic measure for patients who need it (Araújo & Silva, 2007; Astudillo, Mendinueta, & Granja, 2008).

Terminally ill patients and their families report that, at the end of life, honest communication is of vital importance (Heyland et al., 2006). Lack of communication and lack of hospice care result in many terminally ill patients and their families being unable to experience a "good death." Nurses may appear to be ideally placed to facilitate and support communication regarding the prognosis and referral of hospice between patients, their families and other professional caregivers (Schulman-Green, Cherlin, McCorkle, Carlson, Pace, Neigh & Bradley, 2010).

Taking into consideration these approaches, this study aimed to determine the type of health education related to PC that provides the nursing staff to adult end-stage oncology patients and adult (chronic) non-oncologic patients in the terminal phase and to their family in a hospital of the government of Puerto Rico according to the parameters of the Guide of Clinical Practice on PC of the National Health System of Spain (2008).

Different authors have agreed on the need to carry out studies on PCs in the Caribbean, including Puerto Rico (Maharaj & Harding, 2016). These authors indicate that contextual studies will contribute to the establishment of health care policies, staff training, education and access to analgesia support services and PCs in this region.

This study can be replicated through other hospital and care facilities for elderly people in Puerto Rico and in other countries, with the objective of carrying out comparative studies aimed at establishing protocols of nursing interventions based on effective methodologies in palliative care (PC).

2. Method

2.1 Instruments and Participants

2.1.1 Instruments

For the data collection, eight (8) instruments were developed based on clinical documents commonly used in hospitals in Puerto Rico. This article presents those used to compile information related to the family education construct: Instrument IVa - Oncology Adult Patient Education Checklist in Terminal Phase and Family & Opiate Management Registry: Medical Record; and Instrument IVb - Adult (Chronic) Non-Oncological Outcome in the Terminal and Family Phase and Record of Administration of Opiates: Medical Record. Each instrument consists of two parts: Part I - General education of nursing staff to patients and families consisting of 21 criteria and Part II - Specific education of nursing staff to patients and families related to pain and administered opiates consisting of five Criteria. For each criterion, yes or no was identified if the education process was carried out; And Not Applicable to identify if the state of the patient did not apply the education criterion.

2.1.2 Participants

The population of the study consists of the total admissions of a hospital of the government of Puerto Rico during the period from July 2014 to June 2015 (n = 9,862). From this population, a convenience sample of 370 medical records that met the inclusion criteria were selected of oncological OT (185) and non-oncological (chronic) end-stage patients NOT (185) from the Department of Health Information Management. Inclusion criteria are end-stage adult oncology patient records and end-stage (chronic) non-oncologic adult patients with a life expectancy of six (6) months or less. The criterion was examined through the analysis of nursing notes in the medical record. Data were analyzed through descriptive and inferential statistics to identify, compare and correlate factors that influence PC.

The study follows a descriptive-correlational design of collection of secondary data from medical records of a government hospital in Puerto Rico. The Chi-square test was used to demonstrate the interdependence among variables related to health education with a 95% confidence index. To perform this test, we first calculated the frequencies of the "yes", "no" and "not applicable" alternatives for each variable in OT and NOT patients. Then the expected frequencies for each variable were determined to find Chi-Square (X²), degrees of freedom (GL), and probability (P). The value of P was determined if the null hypothesis for each health education and opioid administration variable was accepted or rejected.

Results. Table 1 summarizes the results of the X2 test on the general education area provided by nursing staff to patients and families. This table shows the statistically significant difference for 4 of the 21 criteria that tax the variable education to patients and families: 1) Diagnosis, signs and symptoms, 2) Medical treatment, 3) Restrictions and 4) Skin care.

Variable	X2	GL	P	Hypothesis
Advanced Intubation Guidelines (DNI)	4.0526	2	0.1318	Null
Non-Resuscitated Advance Guidelines (DNR)	2.5485	2	0.2796	Null
Diagnosis, signs and symptoms	16.8928	2	0.0002	Alternates
Medical treatment	9.1380	2	0.0104	Alternates
Nursing treatment	2.7935	3	0.3560	Null
Importance, precautions and effects of medications	2.9155	2	0.2328	Null
Diet and nutrition	2.4083	2	0.2999	Null
Restrictions	6.4555	3	0.0160	Alternates
Isolation	4.9868	3	0.1072	Null
Prevention of infection by multiresistant organisms	2.0088	3	0.4642	Null
Venous catheter care	2.7869	3	0.2732	Null
Urinary catheter care	3.4774	3	0.1621	Null
Cleaning and hygiene habits	0.4456	2	0.8003	Null
Skin care	6.1633	2	0.0459	Alternates
Enteral and parenteral feeding techniques and precautions	3.1803	3	0.3647	Null
Physical and occupational exercise techniques	2.1789	2	0.3364	Null
Breathing exercise techniques	3.3075	2	0.1913	Null
Use of treatment-related equipment	2.6574	2	0.2648	Null
Importance, precautions and adverse reactions to blood transfusions and their derivatives	2.8570	3	0.3326	Null
Spiritual counseling	1.7365	2	0.4197	Null
Guidance on psychosocial problems and needs	2.4724	2	0.2905	Null

Table 1: *Chi-Square statistical analysis for the fourth question of the study in the area of education to patients and families*

Table 2 summarizes the results of the X2 test on education in the area of opioid administration in which a statistically significant difference was found for all the criteria that tax the variable.

Variable	X2	GL	P	Hypothesis
Pain scale	14.2793	2	0.0008	Alternates
Description of pain- Includes generalized pain	9.8828	2	0.0071	Alternates
What relieves the pain?	12.5731	2	0.0019	Alternates
How does pain affect the patient?	10.2436	2	0.0060	Alternates
Opiates administered	36.5777	2	6.56E ⁻⁰⁹	Alternates

Table 2: *Chi-Square statistical analysis for the fourth question of the study in the area of education to patients and families on the administration of opiates*

Figure 1 summarizes the representation of the distribution of the Nurse Education Indicator Rate corresponding to the comparison between OT and NOT patients.

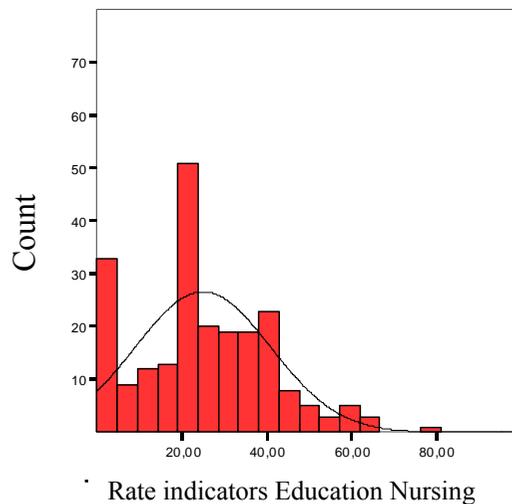


Figure 1: *Histogram Nurse Education Indicator Rate*

Table 3 contrasts the differences in health education provided by the nursing professional to the patient and the family. Significant differences were found for indicators number: 3, 4, 14, 22, 23, 24, 25, and 26. Likewise, a

health education achievement rate has been constructed, which is higher in OT patients.

Variables	OT (n=101)		NOT (n=124)		p
	n	%	n	%	
Part I. General education of nursing staff to patients and families					
1. Advance No-Intubation Guidelines (DNI) [Not applicable: OT= 1; NOT= 0]					
No	58	58.0	86	69.4	0.105
Yes	42	42.0	38	30.6	
2. Advance instructions for no resuscitation (DNR) [Not applicable: OT= 1; NOT= 0]					
No	59	59.0	83	66.9	0.277
Yes	41	41.0	41	33.1	
3. Diagnosis, signs and symptoms [Not applicable: OT= 1; NOT= 0]					
No	71	71.0	114	91.9	<0.001
Yes	29	29.0	10	8.1	
4. Medical treatment [Not applicable: OT= 1; NOT= 0]					
No	79	79.0	114	91.9	0.010
Yes	21	21.0	10	8.1	
5. Nursing treatment [Not applicable: OT= 1; NOT= 1]					
No	34	34.0	51	41.5	0.316
Yes	66	66.0	72	58.5	
6. Importance, precautions and effects of medications [Not applicable: OT= 1; NOT= 0]					
No	80	80.0	106	85.5	0.364
Yes	20	20.0	18	14.5	
7. Diet and Nutrition [Not applicable: OT= 1; NOT= 0]					
No	29	29.0	48	38.7	0.168
Yes	71	71.0	76	61.3	

8. Restrictions [Not applicable: OT= 8; NOT= 0]						
No	80	86.0	105	84.7	0.934	
Yes	13	14.0	19	15.3		
9. Isolation [Not applicable: OT= 3; NOT= 0]						
No	79	80.6	106	85.5	0.432	
Yes	19	19.4	18	14.5		
10. Prevention of infection by multiresistant organisms [Not applicable: OT= 2; NOT= 0]						
No	86	86.9	110	88.7	0.832	
Yes	13	13.1	14	11.3		
11. Venous catheter care [Not applicable: OT= 3; NOT= 0]						
No	65	66.3	79	63.7	0.792	
Yes	33	33.7	45	36.3		
12. Urinary catheter care [Not applicable: OT= 4; NOT= 0]						
No	85	87.6	109	87.9	1.000	
Yes	12	12.4	15	12.1		
13. Cleaning and hygiene habits [Not applicable: OT= 1; NOT= 0]						
No	75	75.0	97	78.2	0.682	
Yes	25	25.0	27	21.8		
14. Skin care [Not applicable: OT= 8; NOT= 4]						
No	80	80.0	112	90.3	0.045	
Yes	20	20.0	12	9.7		
15. Enteral and parenteral feeding techniques and precautions [Not applicable: OT=1; NOT= 0]						
No	78	83.9	105	87.5	0.578	
Yes	15	16.1	15	12.5		
16. Physical and occupational exercise techniques [Not applicable: OT=3; NOT= 9]						
No	97	7.0	115	92.7	0.268	

Yes	3	3.0	9	7.3	
17. Respiratory exercise techniques [Not applicable: OT=1; NOT= 0]					
No	90	91.8	105	91.3	1.000
Yes	8	8.2	10	8.7	
18. Use of treatment-related equipment [Not applicable: OT=1; NOT= 0]					
No	63	63.0	75	60.5	0.805
Yes	37	37.0	49	39.5	
19. Importance, precautions and adverse reactions to blood transfusions and their derivatives [Not applicable: OT=1; NOT= 0]					
No	80	80.8	109	87.9	0.202
Yes	19	19.2	15	12.1	
20. Spiritual counseling [Not applicable: OT=1; NOT= 0]					
No	93	93.0	118	95.2	0.689
Yes	7	7.0	6	4.8	
21. Guidance on psychosocial problems and needs					
No	89	89.0	100	80.6	0.127
Yes	11	11.0	24	19.4	
Part II. Specific education of nursing staff to patients and families related to pain and opiates administered					
22. Pain scale [Not applicable: OT=1; NOT= 0]					
No	14	14.0	44	35.5	<0,001
Yes	86	86.0	80	64.5	
23. Description of pain- Includes generalized pain [Not applicable: OT=1; NOT= 0]					
No	82	82.0	117	94.4	0.007
Yes	18	18.0	7	5.6	
24. What relieves the pain? [Not applicable: OT=1; NOT= 0]					

No	81	81.0	118	95.2	0.002
Yes	19	19.0	6	4.8	
25. How does pain affect the patient? [Not applicable: OT=1; NOT= 0]					
No	83	83.0	118	95.2	0.006
Yes	17	17.0	6	4.8	
26. Opiates administered [Not applicable: OT=2; NOT= 0]					
No	21	21.2	76	61.3	<0,001
Yes	78	78.8	48	38.7	
Indicator Rate of Education Nurse Fulfilled (%)					
Media - DE	29.1	14.7	21.6	16.2	<0,001
Indicator Rate of Education Nurse Fulfilled (%)					
<=50%	92	92.0	120	96.8	0.201
>50%	8	8.0	4	3.2	

Table 3: *Evaluation of the type of Health Education provided by the nursing professional to the patient and the family*

4. Discussion and Conclusions

4.1. Discussion

Facing a potentially deadly disease poses challenges not only for the patient and his / her family, but also for the nursing staff (WHO, 2002). This need has contributed to the historical development of the concept of palliative care (PC) throughout the world (Centeno, 1997; Del Río & Palma, 2007; García, 2011; González & Valdovino, 2012; SECPAL, 2014; Webster, Lacey & Quine, 2007, among others) and proposes a sensible intervention that integrates the relief of symptoms in the traditional scheme whose main purpose is to cure (Avellaneda, 2003). The PC trajectory warns of the need to establish health care policies and their integration into the training of personnel facing this challenge (Maharaj & Harding, 2016). Several authors emphasize the importance of paying attention to the control of clinical symptoms such as pain, as well as the psychological, social and spiritual aspects of both the patient and his / her family (Gigena, 2015; Jocham, Dassen, Widdershoven & Nervi & Taboada, 2005). Due to the contact between the nursing staff and the terminal patient, the importance of that link could be affirmed by the trust that promotes the environment that contributes to a "dignified death" or "good

death" through the education of the patient and caregivers (Heyland et al., 2006; Schulman-Green, et al., 2010).

In Puerto Rico initiatives are identified that ascertain the need to establish policies aimed at serving the COP. These have culminated in projects and laws that clarify the concepts: hospice and CP; in addition, the creation of organizations that provide services, although much remains to be accomplished.

As part of the original study from which this analysis is derived, a profile was outlined that contains the peculiar features that characterize each group. The epidemiological profile of adult end-stage oncology (OT) patients whose records were evaluated for the purpose of the study resulted in a 63-year-old male, unemployed male with a college degree, single, born in Puerto Rico, who lives with him, whose main language is Spanish, belonging to the Catholic religion and covered by medical insurance. In addition, it was identified that the type of pathology more frequent of patient of the OT adult was Leukemia.

While the epidemiological profile of end-stage (chronic) non-oncologic adult (NOT) patients whose records were evaluated for the purpose of the study turned out to be a person over 63 years of age, unemployed male with a college education, single, born in Puerto Rico, who lives accompanied, whose main language is Spanish, belonging to the Catholic religion, and covered by medical insurance. Also, it was identified that the type of pathology more frequent of the adult chronic patient (NOT) were the diseases of the brain.

Both groups resemble each other in their profile differentiating themselves in the most frequent type of pathology: OT Leukemia and NOT brain diseases. However, the presence of these identified diseases is in line with McNamara (2006), who presents a list of diseases that qualify recipients of palliative care, including cancer, Motor neuron disease. Apart from the prevalence of the conditions that patients suffering from palliative care, at the time of this study, no literature was identified on the epidemiological profile of these patients in Puerto Rico (Department of Health, 2015). On the other hand, according to vital statistics, in Puerto Rico heart disease, malignant tumors or cancer and diabetes mellitus tend to be the first causes of death. Of these deaths, "cancer is the second cause of death in Puerto Rico with an average of 5,000 lives lost annually and its negative effects have been felt in the Puerto Rican family" (Department of Health, 2015, p.6), which is partially consistent with the results of this study.

This study seems to confirm the assertion by Yong et al. (2008) that in general terms patients are reluctant to raise spiritual issues, since in 18% of the total of study files no data was recorded on religious belief.

The Ministry of Health and Social Policy of Madrid (2009) states that primary care is the basic level in providing care to patients with terminal illness, facilitating access to necessary therapeutic and care resources in the

patient's domain through education that contributes to improve the self-care of both the patient and the caregiver. This approach seems to contradict the results of this study, since there is evidence in the patient and family education records in most of the criteria, except for nutrition and diet education that was highlighted only in NOT patients with 61.3 percent. Likewise, the closest score for both groups was 66 percent for OT and 58.5 percent for NOT patients in nursing treatment education. The lowest scores were those of OT patient for enteral and parenteral feeding and parenteral techniques and precautions with 3 percent and for NOT patient the score of 4.8 percent for importance, precautions and adverse reactions to blood transfusions and their derivatives.

Although the literature points out the importance of educating the family so that they can collaborate effectively and actively in the care of the patient in the present study, this effort is not documented. Nevertheless, scholars of the subject claim that the responsibility of educating adequately on the control of symptoms, postural changes and personal hygiene, among others (Araya, Guamán & Godoy, 2006) is reinstated in the health team, which is not confirmed in the results of this study. In this educational process, according to Ortega (2012), it is necessary to anticipate to the family relevant information related to the procedures in the framework of the disease process and the impact of the disease, as well as the factors that increase the stress in the family and their pain.

In contrast, it should be noted that for this study psychosocial education was considered, with a low presence in OT patient files with 11 percent and NOT with 19.4 percent. Researchers warn that faced with the imminence of death, the family could face certain fears that the health care team must take into consideration (Monterola, 2010). That is why there must be an appropriate approach by the health care team that allows the identification of these or other fears such as: not having the resources to help you, not being present in those moments, not knowing how to distinguish the last phase, not how to confront them (Gómez, Roca, Pladevall, Gorch & Guinovart, 1993). In the data found, there is insufficient evidence to corroborate the importance of psychosocial education in the experience of these patients in the hospital.

In the course of the evolution and the illness crises can appear of decompensating of the patient and his relatives, in which the problems or their impact are emphasized (SECPAL, 2014). The most frequent causes of decompensating are: poorly controlled symptoms or the appearance of new ones, especially pain, dyspnea, hemorrhage and vomiting. Others like feelings of loss, fears or uncertainty, depression, anxiety, loneliness and doubts about previous treatment or evolution. In the educational development of the family throughout the process, the PC team emphasizes its usefulness in identifying the multiple needs they may have and the supply of knowledge corresponding to the need (Alonso, Vilches and Díez, 2008; Caballero, Naranjo & Fong,

2002, Marín, 2015). We are concerned that unfortunately this educational process is not highlighted in the results.

Also the results contrast significantly the absence of indicators of compliance with the CPG with training actions that have been carried out by several Autonomous Communities of Spain (CAAC) on this subject, among them, a Guide for information to citizenship (Ministries of Health, Social Policy and Equality, 2011). In addition, we emphasize a remoteness in compliance with the indicators when comparing the results of this study, 10 percent for indicators of treatment of nursing and nutrition and diet, with those of an Autonomous Community (CA) that assessed the quality of health services partners who showed a 60 – 70 percent of compliance of the indicators related to the information (Sánchez, Garzón, Sánchez, Díaz, Gil & Pérez, 2008).

Another significant finding rests on what is found in the indicator on education in spiritual counseling in which OT patients got 7 percent and NOT patients with 4.8 percent. Several authors emphasize the patient's spiritual needs such as hope, sense, love, religious or divine inclinations, and coping with death (Benito et al, 2014, Galek, Flannelly, Vane & Galek, 2005, Nixon & Narayanasamy, 2010; Yong et al., 2008); with the very low percentages documented in this study, the long journey that remains for GPC compliance is inferred. According to the results, there is no evidence to show that our results are consistent with the recommendation of Buzzi et al. (2009), which includes the psychological and spiritual aspects of the patient's treatment.

However, the results obtained are consistent with the assertion of several authors that the spiritual dimension has been the least developed area of the PCs (Galiana, Oliver, Gomis, Barbero & Benito, 2013). Two reasons were identified in the literature that seem to explain this. One of them proposed by Selman et al., (2013) in which it is argued that spiritual aspects are poorly handled in clinical practice due to the lack of competence of health personnel in identifying and evaluating spiritual distress. The other reason according to Yong et al. (2008) responds that in general terms patients are reluctant to raise spiritual issues, which makes it difficult to identify this dimension. This was also observed in the lack of data on the spiritual or religious aspects that the patients themselves should report and that for this study were contained in the epidemiological profile in which 18 percent did not record data on religious belief. Both reasons are plausible to mean what was found in this study.

Contrary to the results presented on general education, there is evidence of greater compliance with specific education related to pain and opiates administered, although not in all the indicators that are related to the variable education. A robust compliance was highlighted in indicator one: pain scale, in which OT patients accumulated 86 percent while NOT patients reflected 65 percent. This goes hand in hand with adherence to some fundamental principles of symptom control documented in this study such as: (1) Evaluate prior to treatment to avoid attributing symptoms only to the fact of terminal illness;

(2) Explain the causes of these symptoms; and (3) monitoring of symptoms using standardized measurement instruments (scales or analog scales) and adequate recording schemes (body chart of pain, symptom tables). (SECPAL, 2014).

In indicator five on the education that patients and relatives received regarding opiates, 78 percent were found in OT patients and 61 percent in NOT patients. In general terms, it is more oriented to OT patients than to NOT patients. When considering the analgesic ladder of the World Health Organization (WHO), which proposes a simple scheme for pain relief in cancer; the use of potent opioids such as Morphine and Fentanyl, equivalent to level three used for moderate and severe pain, is highlighted in the results. We also identified Tramadol, Percocet, Tylenol with Codeine and Ultracet equivalent to the second level of the WHO analgesic ladder representing weak opioids for a moderate pain level. Finally, at level one that includes non-opioid analgesics, Demerol was identified for mild pain level. The use of opioids is recommended for the relief of symptoms in particular for cancer patients (Ben-Aharon, Gafter-Givili, Paul, Leibovici & Stemmer, 2008). The pain seems to consistently accompany the patient OT and NOT in the terminal phase.

On the contrary, the following three indicators received the lowest scores for compliance with education. For example indicator two: in pain description OT patients obtained 18 percent and 5.6 percent for NOT patients. Also indicator three: What relieves pain? in OT patients was evidenced by 19 percent and in patients NOT 4.8. Equally low is the score received for indicator four: how does pain affect the patient? with 17 percent for OT patients and 4.8 for NOT patients.

According to the results and the discussion of these, it is imperative to note as one of the limitations of the study is the fact that the results obtained cannot be generalized to the population due to the type of sample selected for convenience. Also note that the admission of cancer patients during the study period was 247 which made it difficult to reach the suggested sample of 185, this study could only obtain a sample of 101 patients that met the inclusion requirements. In addition, during the review of the files it was found that documents relevant to this study were incomplete or blank. On the other hand, some drugs recommended by GPC for PCs are not included in the offer of the participating hospital of this study. Finally, access to the files was limited to the attendance and schedule of the person authorized to provide them.

The discussion presented in this chapter demands us to consider some routes for the continuity of future research on this subject in view of the importance, relevance and scarcity of studies in Puerto Rico. Among these: 1) present recommendations on public policy related to the implementation of CP protocols in hospitals of the Government of Puerto Rico; 2) to carry out qualitative and quantitative design studies in order to ascertain the status of PC in the public and private hospital facilities of Puerto Rico; 3) to carry out

mixed design studies (QUAL / QUAN) aimed at knowing the experience of patients in terminal phase and family on the services they receive in hospitals in Puerto Rico; 4) to study the spiritual and psychosocial aspects of the terminal patient; 5) to know the opinion and perception of the nursing professional about PCs and their training and development needs; And, finally, 6) to study university curricula to determine the content and scope of PCs in programs for the preparation of nursing staff.

Finally, the discussion presented also places us in a better perspective to make recommendations on the management of PCs in Puerto Rico. Among the highlights are: 1) The first step is part of the revision of the protocols for the administration of drugs for the terminal patient, particularly the routes used to include the recommendations of the CPG; 2) Exploration and feasibility of strategies such as the subcutaneous route of hydration to terminal patient; 3) To recommend that a procedure be established to document the dossier in a manner that ensures the follow-up of guidelines for end-stage patient care; 4) Raise awareness about the use of different instruments to assess the patient's autonomy as well as the identification of the pain scale and include them in the medical record; 5) Emphasize the importance of documenting the general education of nursing staff to patients and family as well as the specific education of nursing staff to patients and families related to pain and opiates administered.

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