



ORIGINAL ARTICLE

Self-perception of research skills by members of student scientific groups at three Cuban medical universities

Autopercepción de habilidades investigativas por miembros de grupos científicos estudiantiles en tres universidades médicas cubanas

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ABSTRACT

Introduction: research training and competence during undergraduate studies is a felt need in the modern university.

Objective: to characterize the self-perception of research skills by members of student scientific groups in three Cuban medical universities.

Method: observational, descriptive and transversal study of members of student scientific groups of the Universities of Medical Sciences of the provinces of Pinar del Río, Cienfuegos and Holguín, between January and March 2020. The population was constituted by 74 students. Descriptive statistics and the Kruskal-Wallis test for ordinal variables were used.

Results: the most affected skills were identified as the selection and application of statistical methods (inadequate = 39,19 %) and the selection, elaboration and application of methods, techniques and instruments (inadequate = 27,03 %). The 71,62 % perceived as inadequate their skills in the handling of editorial management systems and 66,22 % in the use of reference managers. An association ($p < 0,05$) was found between research skills and academic year. An association was found between the skills in the handling of information and communication technologies and the use of statistical programs and the exposition of results through multimedia with the academic year ($p < 0,01$).

Conclusions: there is a perceived deficit among students in their research skills and in the handling of information and communication technologies, mainly focused on statistics, statistical systems and reference managers, as well as in the selection and elaboration of methods and the presentation of information.

Keywords: Research; Knowledge Management for Health Research; Students, Health Occupations; Research Groups; Information Technology.

RESUMEN

Introducción: la formación y competencia investigativa durante el pregrado constituye una necesidad sentida en la universidad moderna.

Objetivo: caracterizar la autopercepción de habilidades investigativas por miembros de grupos científicos estudiantiles en tres universidades médicas cubanas.

Métodos: estudio observacional, descriptivo y transversal a miembros de los grupos científicos estudiantiles de las Universidades de Ciencias Médicas de las provincias de Pinar del Río, Cienfuegos y Holguín, entre enero y marzo de 2020. La población de la constituyeron 74 estudiantes. Se empleó estadística descriptiva y la prueba Kruskal-Wallis para variables ordinales.

Resultados: se identificó como habilidades más afectadas la selección y aplicación de métodos estadísticos (inadecuados = 39,19 %) y la selección, elaboración y aplicación de métodos, técnicas e instrumentos (inadecuados = 27,03 %). El 71,62 % percibieron como inadecuadas sus habilidades en el manejo de sistemas de gestión editorial y el 66,22 % en el empleo de gestores de referencias. Se encontró asociación ($p < 0,05$) entre habilidades investigativas y el año académico. Se encontró asociación entre las habilidades en el manejo de las tecnologías de la información y las comunicaciones, el uso de programas estadísticos y la exposición de resultados mediante el multimedia, con el año académico ($p < 0,01$)

Conclusiones: existe un déficit percibido entre los estudiantes en sus habilidades investigativas y del manejo de las tecnologías de la información y las comunicaciones, centradas principalmente en la estadística, sistemas estadísticos y gestores de referencia, así como en la selección y elaboración de métodos y la presentación de la información.

Palabras clave: Investigación; Gestión del Conocimiento Para la Investigación en Salud; Estudiantes del Área de la Salud; Grupos de Investigación; Tecnología de la Información.

INTRODUCTION

The medical sciences student is not only conceived within a merely assistance role, but is also trained to be competent in all the areas in which a health professional can perform, which makes him/her the main engine of change and the basis for the continuity of the work of a Higher Education Institution. For this reason, over the years, a debate has been established around the different roles that students can play, with the main focus on the research role.^(1,2)

During the training of medical science students, the development of their scientific skills is as important as that of their clinical skills. This is due to the fact that knowledge of the scientific method and health research is essential in medical care. This is supported by the fact that, in the care of the sick, the selection of the best available evidence is essential, as it allows them to receive the most updated and relevant treatment for their condition.⁽³⁾

Student scientific research provides an early way to relate to the professional's problems and contributes, in an active way, to create an analytical and scientific mentality in them. It is a task of the teachers to develop in them the motivation for this sphere for the development of a scientific thinking that makes possible their integral formation as professionals.⁽⁴⁾

Student scientific activity should be aimed at increasing scientific knowledge, its search and organization, the development of skills, habits and abilities that lead to creative work, the use of the scientific method and the performance of tasks that allow the solution of problems.⁽⁵⁾

It is important to emphasize that the model of the student as a researcher oriented by the scientific method has not penetrated organically in the curricular design of the health sciences careers in this situation is somewhat different from the Cuban reality, where the improvement of the curricula has allowed its assimilation; however, this is still deficient. This situation requires searching for its causes and directing actions towards an improvement of the student scientific activity (ACE) in higher medical education.⁽⁶⁾

For this reason, for specific research, pedagogical, organizational and managerial purposes, it is necessary to have a theoretical structure that supports this process with a certain level of consistency and aggregation; it is of significant value to establish a uniform classification of CEA. Its main purpose is to offer a set of categories linked to its development, which can be used to coherently present aspects according to the place they occupy in this process.⁽⁶⁾

Studies carried out in countries in the region show the existence of an interest on the part of students in scientific research, but few of them actually present their research at scientific events and congresses.^(7,8)

Although student scientific activity in Cuba is oriented from the training centers themselves, and there is also a whole organizational structure that rewards and stimulates the creation of scientific research by students, the tangible results have shown that its dissemination is not in line with the scientific production itself. Such is the case that Cuban researchers have demonstrated that of the total number of scientific articles published in Cuban medical journals from 1995 to 2014 only 2,26 % had student participation and, furthermore, that there was no collaboration between students from different universities.⁽⁹⁾

During the last few years, scientific research in undergraduate medical sciences has undergone a substantial transformation. The University Student Federation has had a meritorious impact on these transformations, with the creation of the Student Scientific Groups (GCE) and Student Scientific Journals (RCE) by the teaching and research secretariat. This has guaranteed an improvement in the methodological quality and impact of research with respect to previous periods, although there are still difficulties, especially in tutoring, generalization and publication.⁽¹⁰⁾

Taking into account the above, the present study is carried out with the objective of characterizing the self-perception of research skills by members of student scientific groups in three Cuban medical universities.

METHODS

An observational, descriptive and cross-sectional study was carried out on members of the student scientific groups of the Universities of Medical Sciences of the provinces of Pinar del Río, Cienfuegos and Holguín, between January and March 2020. The population consisted of 74 student members of the CSTGs, and all of them were studied.

For the collection of information, a questionnaire based on the instruments of Castro,⁽¹¹⁾ and Vera-Rivero et al.⁽¹²⁾ was applied by three of the authors, who were members of the CGEs of their universities at the time of the study. The variables studied were: age, sex, academic year, career, university, research and scientific writing skills, and skills in the use of information and communication technologies applied to research. The last two variables were operationalized as shown in Table 1, and a Likert-type scale with the categories adequate, moderately adequate and inadequate was used as a measurement criterion.

Table 1. Operationalization of the skills studied.

Research and scientific writing skills	Skills in the use of information and communication technologies applied to research
Formulation of a scientific problem, research objective and hypothesis	Use of databases for the search of information (Scopus, ClinicalKey, SciELO and WOS, PubMed and Lilacs)
Selection of the population, sample and type of sampling	Use of reference managers (Zotero and Mendeley)
Selection, development and application of methods, techniques and instruments	Use of statistical software for data processing (SPSS, MedCalc and EpiInfo)
Selection and application of statistical methods	Presentation of results through the use of ICTs
Elaboration and analysis of the results, and their presentation in the form of figures and tables.	Use of the Open Journal System and other editorial management systems to submit results to scientific journals
Interpretation and discussion of results	
Preparation of conclusions and recommendations	
Writing of the final research report	

The data obtained were deposited in a database created for this purpose and processed using the SPSS IBM version 21,0 statistical package. Descriptive statistics were used by calculating absolute and relative percentage frequencies. To determine the relationship between K samples in ordinal variables without normal distribution, the Kruskal-Wallis H test was used, with statistical significance when $p < 0,05$.

The confidentiality of the data obtained was respected. The bioethical principles of studies with human beings, established in the II Declaration of Helsinki and in the Cuban ethical norms, were maintained as a premise.

RESULTS

The mean age was 21,12 years (minimum: 19; maximum 24); male students were predominant (56,76 %). With respect to the careers, 66 students were from Medicine, 4 from Stomatology, 3 from Nursing and 1 from Health Technologies.

The analysis of the self-assessment of research skills identified as the most affected skills the selection and application of statistical methods (inadequate = 39,19 %) and the selection, elaboration and application of methods, techniques and instruments (inadequate = 27,03 %). Interpretation and discussion of results, as well as the elaboration of conclusions and recommendations were perceived as adequate by 50 % or more of the students (55,41 % and 50 % respectively) (Table 2).

Table 2. Distribution of the members of the Student Scientific Groups according to self-perception of research and scientific writing skills.

Research skills	Scale	No	%
Formulation of a scientific problem, objective	Adequate	31	41,89
	Moderately adequate	31	41,89
	Inadequate	12	16,22
Selection of the population, sample, and type of sampling	Adequate	30	40,54
	Moderately adequate	33	44,59
	Inadequate	11	14,87
Selection, development and application of methods, techniques and instruments	Adequate	24	32,43
	Moderately adequate	30	40,54
	Inadequate	20	27,03
Elaboration and analysis of results, and their presentation in the form of figures and tables	Adequate	26	35,14
	Moderately adequate	29	39,18
	Inadequate	19	25,68
Selection and application of statistical methods	Adequate	11	14,86
	Moderately adequate	34	45,95
	Inadequate	29	39,19
Interpretation and discussion of the results	Adequate	41	55,41
	Moderately adequate	23	31,08
	Inadequate	10	13,51
Elaboration of conclusions and recommendations	Adequate	37	50
	Moderately adequate	29	39,18
	Inadequate	8	10,82
Writing the final research report	Adequate	32	43,24
	Moderately adequate	23	31,08
	Inadequate	19	25,68

It was identified that 71,62 % of the members of the CGEs perceived as inadequate their skills in the use of the Open Journal System and other editorial management systems to send their results to scientific journals, 66,22 % in the use of reference managers (Zotero and Mendeley) and 44,59 % in the use of statistical programs for data processing (SPSS, MedCalc, EpiInfo or MiniTab) (Table 3).

Table 3. Self-perception of skills in handling ICTs

ICT management skills	Scale	No	%
Use of databases to search for information	Adequate	30	40,54
	Moderately adequate	35	47,3
	Inadequate	9	12,16
Use of reference managers (Zotero and Mendeley)	Adequate	8	10,81
	Moderately adequate	17	22,97
	Inadequate	49	66,22
Use of statistical programs for data processing (SPSS, MedCalc and EpiInfo)	Adequate	16	21,63
	Moderately adequate	25	33,78
	Inadequate	33	44,59
Presentation of results through the use of ICTs	Adequate	45	60,81
	Moderately adequate	18	24,32
	Inadequate	11	14,87
Use of the OpenJournal System and other editorial management systems to submit their results to scientific journals	Adequate	8	10,81
	Moderately adequate	13	17,57
	Inadequate	53	71,62

When analyzing the association between research skills and academic year, only the selection, elaboration and application of methods, techniques and instruments and Interpretation and discussion of results showed no association ($p>0,05$) (Table 4).

Table 4. Relationship between research skills and academic year.

Research skills	1st year (n=2)			2nd year (n=18)			3rd year (n=19)			4th year (n=13)			5th year (n=10)			6th year (n=2)			P
	A	M	I	A	MA	I	A	M	I	A	M	I	A	M	I	A	M	I	
Formulation of a scientific problem, research objective and hypothesis	2	0	0	0	10	8	11	7	1	6	6	1	7	2	1	5	6	1	<0,01
Selection of the population, sample and type of sampling	0	2	0	1	7	10	10	8	1	6	7	0	7	3	0	6	6	0	<0,01
Selection, development and application of methods, techniques and instruments	0	2	0	3	5	10	6	8	5	6	6	1	3	6	1	6	3	3	0,101
Selection and application of statistical methods	0	0	2	0	6	12	7	8	4	2	6	5	2	6	2	0	8	4	<0,01
Elaboration and analysis of results, and their presentation in the form of figures and tables	0	2	0	1	4	13	10	5	4	4	9	0	6	3	1	5	6	1	<0,01
Interpretation and discussion of the results	0	2	0	7	4	7	12	6	1	9	3	1	8	2	0	5	6	1	0,059
Elaboration of conclusions and recommendations	2	0	0	5	7	6	11	6	2	8	5	0	8	2	0	3	9	0	0,012
Writing the final research report	0	2	0	2	3	13	8	6	5	8	4	1	6	4	0	8	4	0	<0,01

The analysis of ICT skills identified an association between the Use of statistical programs for data processing (SPSS, MedCalc and EpiInfo) ($p<0.01$) and the presentation of results through the use of ICT with the academic year ($p<0.01$) (Table 5).

Table 5. Relationship between ICT skills and academic year.

ICT management skills	1st year (n=2)			2nd year (n=18)			3rd year (n=19)			4th year (n=13)			5th year (n=10)			6th year (n=2)			P
	A	M	I	A	MA	I	A	MA	I	A	MA	I	A	MA	I	A	MA	I	
Use of databases for information search (Scopus, ClinicalKey, SciELO and WOS, PubMed and Lilacs)	2	0	0	4	11	3	9	6	4	5	8	0	6	4	0	4	6	2	0,192
Use of reference managers (Zotero and Mendeley)	0	2	0	1	1	16	3	7	9	1	4	8	2	2	6	1	1	10	0,056
Use of statistical programs for data processing (SPSS, MedCalc and EpiInfo)	0	0	2	0	1	17	3	1	6	2	7	4	5	3	2	6	4	2	<0,01
Presentation of results through the use of ICTs	0	0	2	6	8	4	16	0	3	9	3	1	7	3	0	7	4	1	<0,01
Use of the Open Journal System and other editorial management systems to submit results to scientific journals	0	0	2	1	1	16	3	7	9	1	4	8	2	0	8	1	1	10	0,102

DISCUSSION

Scientific research constitutes one of the foundations on which the integral formation of a student is based. This concept should not only be applied to the health sciences; it should be generalized to all areas of knowledge. This is because the modern university should no longer conceive the student as a mere consumer of knowledge, but as an active entity in its production.

In order for graduates to meet the challenges of today's society, they must be able to produce knowledge, innovate with the resources at their disposal, and for this they need knowledge that allows them, far from reproducing knowledge, to reach an analytical and/or applicative level. That is, to be able not only to identify a problem and the factors that influence it through previous knowledge, but also to arrive at its solution with the means at their disposal, and if necessary, to create tools and/or processes for its solution and prevention.

The average age identified in the present research corresponds to the regular age period of students in university careers in Cuba. However, the predominance of the male sex differs from that observed by Margariño-Abreus et al,⁽¹³⁾ a fact that may be influenced by the enrollment of the universities studied.

With respect to the variable career, there was a higher frequency of students belonging to Medicine; this coincides with the global enrollment of students of Health Sciences in Cuba.

The training of research skills is a necessity not only because of the above, but also because it constitutes one of the substantive processes of the University as well as one of the specific functions included in the graduate profile.

In this aspect, the present study identified the existence of gaps in several research skills among the respondents. Among them, the selection and application of statistical methods stood out with the greatest deficit, classified as inadequate; data that was congruent with those reported by Colás-Bravo et al,⁽¹⁴⁾ in their research on research competencies in higher education.

Another skill perceived as inadequate was the selection, elaboration and application of methods, techniques and instruments. These results are similar to those presented by Sánchez-Ortiz et al,⁽¹⁵⁾ in undergraduate nursing students, and the study of Acón-Hernández et al.⁽¹⁶⁾

The present investigation showed that the best preparation is found in the interpretation and discussion of the results in tables and graphs, the elaboration of conclusions, recommendations and final research reports. These results coincide with those reported by Vera-Rivero et al. This is to be expected, since students are trained to perform these tasks throughout their careers in their own subjects and research areas.

The inadequate use of bibliographic managers in the words of Siu-Pacheco,⁽¹⁷⁾ is mainly due to lack of knowledge and practice, which for the authors of this research also applies to the use of statistical processing programs.

This study identified inadequate knowledge in the participants regarding the use of the aforementioned technologies. Therefore, the use of bibliographic managers and statistical programs in the Biostatistics subject of the Research Methodology discipline is key for the student to grow familiar with these tools.

Likewise, advances in science and technology mean that Information Literacy strategies and programs must advance in the same way. To this end, they should be a feedback process, which is nourished by new deficiencies in computer and information literacy in order to trace and reevaluate actions aimed at solving them.

A high percentage of students expressed their inexperience in handling the Open Journal System and other editorial management systems for submitting their results to scientific journals. This is the result of the convergence of several factors, such as inexperience in scientific publication, which in turn is determined by the lack of content in the curriculum on "how to publish". However, the responsibility to bridge this gap lies with both the academy and the CGEs, since this deficiency denotes a lack of articulation between the different actors in the processes involved in student research.

It is expected that a university student, as he/she advances in his/her education, will increase his/her research expertise and the skills associated with this practice.⁽¹⁸⁾

The analysis of the association between the academic year variable and the different research skills and ICT mastery was statistically significant. This shows that despite the deficiencies that may be shown in the formative processes related to them, strategies are drawn up to improve these skills. This may imply the existence of an interest among students in research, as well as an implicit commitment to become a graduate with greater scientific-technical capabilities.

It is concluded that students perceived a deficit in their research skills and in the handling of information and communication technologies, mainly focused on statistics, statistical systems and reference managers, as well as in the selection and elaboration of methods and the presentation of information.

Conflict of interests

The authors declare that does not exist an interest conflict. Although AAVC and WJRC are part of the magazine's editorial committee, they did not participate in the editorial process of the article.

Authorship Contribution

HLT: conceptualization, project management, methodology, formal analysis, writing-initial draft, writing-revision and editing.

AAVC: conceptualization, methodology, formal analysis, research, writing-initial draft, writing-revision and editing.

RJRM: research, writing-reviewing and editing.

WJRC: research, writing-initial draft, writing-revising and editing.

ASR: formal analysis, writing-initial draft, writing-revision and editing.

AARC: methodology, supervision, writing-revision and edition

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