

Scientific Integrity and the Academy: A Vision from University Students of Colombia and México

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Keywords:

Integrity science; scientific misconduct; ethical deviation; academic training; update, complaint, sanctions, dishonesty.

ABSTRACT

The problem of unethical behavior in science and academia has grown to become a topic of concern in areas related to the generation of knowledge and the training of future researchers, at the level of students to the lack of training at the institutional level and in professionals due to the growing demand to publish, among other factors. Describe the importance and practices that university students have training in recognizing elements of scientific and academic misconduct. A descriptive cross-sectional study was conducted on 33 students from Colombian and Mexican universities, both public and private, through the application of a survey constructed by 12 questions related to their practices of scientific totality in the recognition of probable errors of misconduct and their normalization whether intentional or not. For the analysis, the Wizard 2.0@ program was used. Twenty-two (22) Students recognize the importance of scientific integrity for their research and professional training, in addition, that institutions should be permanently trained in these topics. The needs design a model for complaints and sanctions; but also, the universities reinforce the value of training quality in scientific and academic integrity.



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1. INTRODUCTION

Scientific integrity encompasses the observance and promotion of ethical principles and professional responsibilities in the exercise of research, which inspire and guarantee good practice [1], [2]. More and more countries have offices, agencies or other structures dedicated to scientific integrity, as well as national and transnational networks and forums, which hold global conferences on the subject. However, there is no globally consensual definition of scientific integrity [1:3–5].

Scientific integrity corresponds to a pattern of conduct in research characterized by the evaluation of deontological principles that inspire and guarantee a precise and responsible praxis [6- 12]. That is why society must be attentive since it is participating in scientific research by sharing resources, collecting data, and helping to analyze them, where scientific culture must be accessible to everyone [5], [7]. Objective.

Describe the importance and practices that training in recognizing elements of scientific and academic misconduct have for university students

1.1 The scientific system a polarizing issue in Latin America

Redalyc celebrates its 19th anniversary and has fully fulfilled its initial objective: to give visibility and positioning to the scientific production of the region, strengthening the editorial processes of our Open Access journals, and promoting a free, open, collaborative, free, non-commercial, and sustainable scientific communication [13].

Several Latin American countries have proposed several standards, but there is still no precise regulatory framework [1], [3], [9], [14]. However, there are soft law regulatory frameworks such as the Singapore Declaration [15] and the Montreal Declaration [16], which propose a set of principles for the researcher related to honesty, respect, transparency, accountability, among others that tend towards ethics and safety in research [17].

Science must be limited in its practice to integral people; but because scientists are constituted of the same subject as the rest of their kind, they do not escape behaviors lacking integrity during the exercise of their profession [18- 20]. Therefore, moral behaviors in the face of scientific and personal activity may, although they should not, be dissociated and in this context this reflection is placed more on the level of moral solidity than on that of globality [3], [9], [14], [21- 23].

1.2 Scientific integrity in Colombia.

According to the National Code of Scientific Integrity of CONCYTEC, it consists of the result of adherence to values and good practices to conduct and apply the results of what to do scientific. Scientific integrity is applied in the phases of formulation, proposal and realization of research, the communication of results and relations of cooperation and minority [24], [25].

But in recent decades, he continues, "it has been differentiating with what is called scientific integrity, associated with the attitudes or behavior of the researcher in the research process. Although, both topics are deeply connected, since there are differences in how they have been developed in the field [5], [26], [27]. In Colombia since 1975, with the promulgation of Decree No. 526, there have been significant advances in scientific development in the area of health research. Part of the regulation of two laws No. 10/1990 and No. 29/199 were based on Resolution No. 8430/1993 of the Ministry of Health, known as Scientific, Technical and Administrative Standards for Health Research. Although a new regulation complementary to the one issued in 1993 has been established to regulate clinical trials in 2008, the institution in charge does not have the adequate infrastructure to guarantee compliance with the guidelines considered within the standard and that are fundamentally the operational guidelines of PAHO [7], [23], [28], [29].

1.3 Ethical conduct in the university environment

More and more publications about unethical behavior can be found in universities and in scientific research, which requires a strong wake-up call to combat what are apparently isolated behaviors, and which, according to offenders, and those who hide those facts, have little impact; the reality is that misconduct seriously affects the image of the university, science, academics, and students [30- 32].

The problem of unethical behaviors in scientific activity has been increasing to become a worrying issue in all areas related to the generation and dissemination of knowledge and the training of future researchers in the training of young researchers and research seedbeds, where one of the main causes for this type of

behavior is found in the growing demand for productivity posed by the certifying bodies of the quality of research and the struggle to achieve or maintain the stimuli that the State offers to encourage scientific and technological production, which are subject to increasingly serious evaluations and constructed from a quantitative and productivist vision of a more entrepreneurial than academic nature.

In addition to these elements, there is undoubtedly a lack in the professional ethical training of those who are going to dedicate themselves to the research activity, who often ignore and sometimes relativize or disqualify the valid criteria of action that should govern the activity of knowledge generation [30].

1.4 Teaching ethics and unethical behaviors

Talking about professional ethics does not necessarily mean that the subjects act in accordance with it. It can remain invisible in everyday life, routine and social particularity, acting as a reference for action. As we have said, teachers not only transmit disciplinary content, but also ethical knowledge; to this end, it is essential that they know how to integrate the legitimate expectations of other professions and social sectors, with special reference to the legitimate demands and demands of the direct beneficiaries of the profession, which in the case of education are students and their parents [33].

A university professor is not only the person in charge of teaching his discipline, since we cannot ignore that he transmits more than he formally teaches and, sometimes, that may be the most valuable and the most lasting. Its influence among students goes beyond the transmission of knowledge and in this, the ethical relationship plays an indispensable role, projecting the teacher his quality as a person, remembering that teachers are a model for our students [34].

Specifically with respect to the teaching profession, he argues that a good teacher has to be a competent and ethically upright professional. But these two components don't always go hand in hand, although you'd expect that to be the case. In the ethical assessment of this professional three elements intervene: their qualification, their intentions and the results achieved, from this different scenario can be produced [33].

In general, unethical behaviors are defined as opposed to those considered ethical or acceptable, or typologies are characterized and elaborated; however, it is less common to find a proper definition. For example, they focus on the distinction between unethical practices and illegal practices, arguing that there are circumstances in which one acts unethically, but not necessarily within illegality and vice versa. There may also be unethical laws before which people may decide to change them or not abide by them by appealing to broader moral or ethical standards [35].

For his part, Macrina (2014) characterizes "misconduct" in terms of serious deviations from codes of ethics or breaches that affect performance. According to his approach, for a conduct to be considered bad, there must be a significant deviation from the practices accepted by the community, as well as the conscious or reckless intention of the perpetrator, which must be demonstrated with strong evidence [35].

1.5 The magazine "Colombia Reports" criticizes the misconduct of Colombian universities.

Plagiarism and predatory journals "an economic and ethical problem in public universities in Colombia." The President of the University has appointed Professor Boniface Kokoh as a reference for scientific integrity [21:36–38].

Finally, some recommendations have been raised in the fight against this phenomenon, which should adopt measures that try to prevent and locate fraud early, in addition to giving greater importance to quality than to

the quantity of work, as well as to the articulation between institutions to punish those involved and institutional and individual awareness against fraud. Some of the objectives consist of the optimization of training courses in ethics of science and scientific writing for researchers, publishing in journals indexed in databases and bibliographic indexes of recognized trajectory (Scopus, Web of Science, Scielo, Lilacs, Redalyc, Copernicus, among others) and whose affiliation is in force, that the editorial teams of scientific journals are rigorous in the detection of plagiarism incorporating anti-plagiarism systems plagiarism that breaks the language barrier and, finally, promote and solidify typologies of scientific publication such as letters to the editor, in which such practices can be denounced [21], [36- 38].

Among the most common errors are: fictitious authorship, phantom authorship, duplicate publication, fragmented publication or salami publication, inflated publication, self-plagiarism, incorrectness of bibliographic citations, publication biases and early publication [12], [22], [39- 42].

1.6 Reputation of universities in relation to integrity and creation of regulatory bodies

Sweden's government defends the new system on the grounds that delegating inquiries to universities is a potential source of conflict of interest. Difficulties arise in conducting impartial scrutiny, just as it proved problematic for higher education institutions to investigate suspicions about their scientists while protecting their own reputations"; the government reported in a statement published on its website [12], [31], [32], [43].

The offices or Councils of Misconduct in the Investigation study all those suspicious cases covering scientific investigations carried out in public and private institutions of the country and to disseminate the results of such investigations. If the allegations are confirmed, scientific development agencies, universities and research institutes will decide to apply specific sanctions to scientists. Eventually, these bodies could be advised by resorting to a Central Ethics Committee, without commitment to have to adapt to its guidelines [2], [44], to deal with cases of: abuse of students in the process of investigation, abuse of power, sexual harassment, authorship (researchers appear as authors of articles in which their contribution was null or very poor); complicity (researchers witness breaches of ethics and do nothing to denounce them or remedy them); commitment (researchers get all the benefits of belonging to an academic institution, but do not give back); unfair assessments; fraud (fraudulent handling of data to favor a hypothesis or increase the publication rate); plagiarism; rigor and sabotage (researchers intentionally slow down the scientific advancement of their counterparts), among others [45].

The idea of focusing investigations on episodes of misconduct is under debate in several countries with the aim of guaranteeing a common model for investigating complaints and sanctions among these Colombia in relation to universities having the ability to self-regulate as an element of compliance with quality standards required by institutions through the drafting of codes of ethics with the imposition of sanctions on offenders [10], [28], [31], [46], but also related to the fact of encouraging authors to attend to the highest standards of ethics in research and publication.

The quality indicators that universities normally boast about, such as the ability to obtain funding and publish articles in high-impact journals, depend on a solid foundation, robust methodologies and transparently disseminated results, they said in the text. Universities should publicly reinforce the value of research quality, using it as a criterion for selection processes, promotions and rewards. They should also ensure resources to spread that message among students and staff at all levels, through training in experiment planning and data analysis [14], [28], [32], [31], [46], [47].

Academic dishonesty and corruption are not new phenomena, they have always existed as part of a tension

in human nature in which, on the one hand, we tend to seek the expected results with the least possible effort [1], and on the other, to do the right things as indicated by the prudential judgment of our conscience [30-32], [48]. Research conducted on the perception and frequency with which acts of academic dishonesty are committed suggests that there is a serious problem that needs to be addressed. Firstly, those who cheat do not learn and secondly, but no less importantly, because participation in dishonorable acts to the detriment of personal growth with relevant implications for one's own and others' future. It is necessary to address this problem that threatens the learning and integrity of students [48].

2. Methodology

A descriptive cross-sectional study was carried out on 33 students from different national universities and Mexico, both public and private, through the application of a survey consisting of 12 questions related to their practices of scientific integrity in the recognition of possible errors of misconduct and their normalization, whether intentional or not, due to ignorance or lack of academic and research standards. As well as the importance that students give to this type of activities such as fraud, plagiarism, ghost authorship, among others. The instrument was applied during the month of July 2022 by virtual means, using the Google Form tool.

For the analysis of the information, the Wizard 2.0 ® program was used to analyze the possible structural relationship of good scientific behavior practices, as well as frequency analysis.

The respective informed consent was applied, making known the objective of the study, as well as clarifying elements of how the principle of confidentiality and privacy of the information provided by the students will be respected. The research was classified as risk-free according to declaration 8430/93 which establishes the scientific, technical, and administrative standards for health research in Colombia.

3. Results

It was observed that the students participating in this study are from both public and private universities in countries of Mexico and Colombia. It was represented by twenty-six (26) women, representing 79%. The student population in greater frequency are of semesters of 9th and 7th level academic training. When the students were asked if they considered important the elements related to ethics or scientific integrity in their academic and research training, twenty-two (22) responded at the highest level, that is, they gave it a value of 5.

Nine (9) students gave it a value of 4. Only three (3) students gave it the value of 2, which shows that for them the importance is linked to the process they have at the time, that is, if it is academic or research.

Regarding the lack of knowledge that students have about concepts and practices considered to be scientific and academic misconduct, twenty (21) of students describe that they do not know in depth concepts such as phantom authorship, which implies that possibly to normalized practices such as including colleagues who have not contributed anything in academic work or research activities. On the other hand, six (6) indicated that they do not know that it is plagiarism in depth, five (5) students the conjugation of several elements such as Plagiarism, Falsehood of Information, Fraud, Ghost Authorship, which is related to the fact that they do not know if the university or corporation has designed sanction mechanisms towards elements such as Plagiarism, Falsehood of Information, Fraud, Ghost Authorship, even fifteen (15) describe that they have never heard it from any professor or director of the university or corporation. However, fourteen (14) students describe that they have never had practices that could be considered unethical or considered a lack of scientific integrity. But the rest of the students have normalized plagiarism practices in their different manifestations

intentional or not, among these we have for example: Search and Replace Plagiarism, Remix Plagiarism, Cloned Plagiarism, Mosaic Plagiarism, Copied and Pasted Plagiarism, even the mixing of all in a single document; but before these practices only four (4) students define that they are in the error of plagiarism and one (1) as plagiarism and fraud, the others show ignorance as the erroneous practice is pigeonholed in plagiarism and thirteen (13) do not know it completely (See Table 1).

The students in 9.1% even mentioned that at the time of reading a little on the subject of plagiarism they endured the fact that training in these topics should be aimed not only at students, but also at teachers since they describe that they have seen these practices of plagiarism in their trainers, and 24.2% mention that possibly since they do not request clarification in these elements to their teachers, that when they present their slides many of them do not have bibliographic references.

Students describe the need for institutions to implement training courses on scientific and academic integrity on an ongoing basis and not wait to make the mistake to be sanctioned with a Correlation Coefficient [CC=0.314] (See Table 2), but who also do not know the mechanisms for reporting misconduct. (See Figure 1).

Students from all participating universities showed an interest in deepening and recognizing elements related to scientific integrity with a correlation coefficient (CC) [CC=0.342], to avoid plagiarism or fraud practices [CC=0.359]. It was also observed that women more in the fact that universities and corporations must organize periodic training days not only for students, but also for teachers [CC=0.331]. (See Table 2)

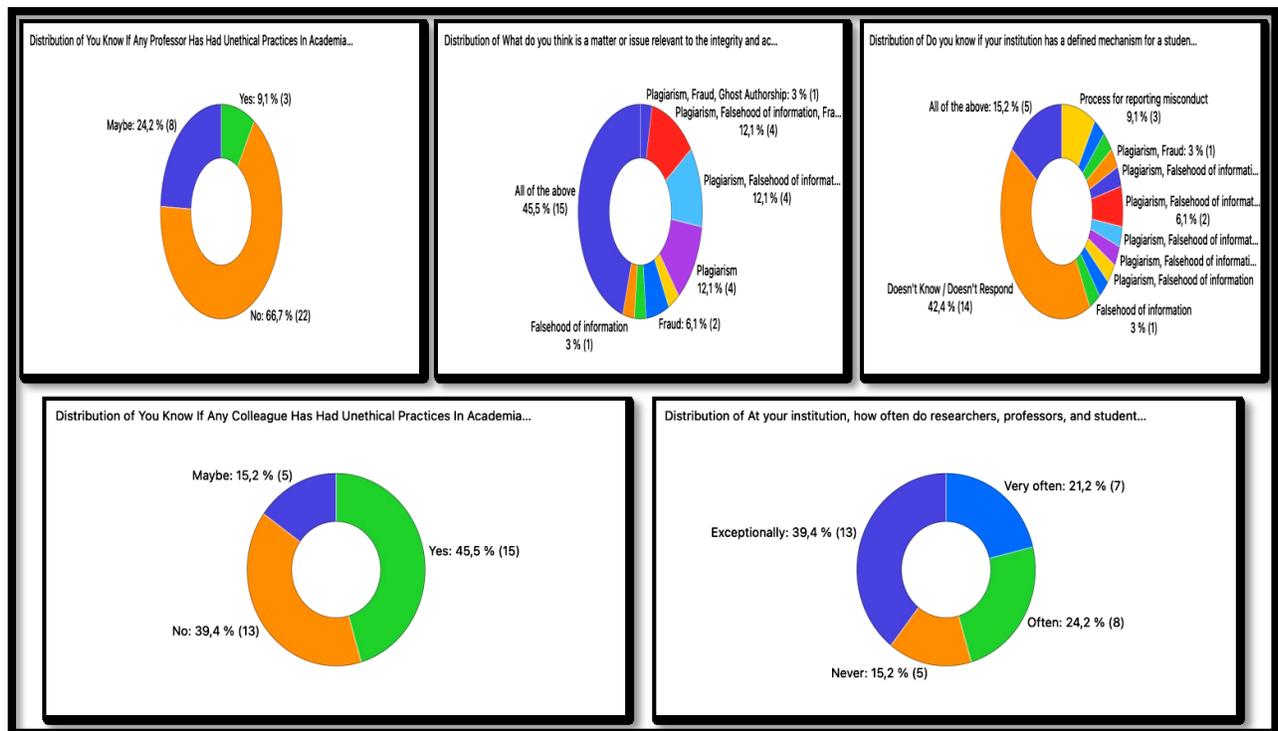


Figure 1. Distribution of the importance of implementing training seminars and establishing a mechanism for reporting misconduct.

Table 1. Characterization of the student population and description of their perception of lack of scientific integrity

University / Corporation	Sex	Semester		Importance of Scientific Integrity		Lack of Knowledge of Concepts		Do you know if your institution has a mechanism to respond to the following elements?		Errors of ethical deviation		What kind of practices you would pigeonhole		
RAFAEL NÚÑEZ UNIVERSITY CORPORATION	Female	2016	2019	5	2	2	2	Ghost Authorship	2	1	None of those mentioned	1	None of the above	1
POPULAR UNIVERSITY OF CESAR	Male	7	7	7	4	9	4	Academic Fraud	4	6	Change key words and expressions without altering the essential content of the sources.	3	Plagiarism	4
UNIVERSITY OF THE ATLANTIC	Total	3	3	8	5	3	2	Falsehood of information, phantom authorship	3	5	Mix paraphrased material extracted from multiple sources and make it look like yours., Change key words and expressions without altering the essential content of the sources.	2	Ghost Authorship	2
CÉSAR VALLEJO UNIVERSITY			4	2	Total	3	3	Academic Fraud, Phantom Authorship	1	2	Mix paraphrased material extracted from multiple sources and make it look like yours.	2	Plagiarism, Fraud	1
PEDAGOGICAL AND TECHNOLOGICAL UNIVERSITY OF COLOMBIA			1	1	2			You don't know any of the above	1	2	Material copied from multiple sources that fit well, even knowing how to do it, change key words and expressions without altering the essential content of the sources.	2	(Blank)	1
MONSERRATE UNIVERSITY FOUNDATION			5	2				Falsification of information	1	2	All of the above.	2	Total	3
AUTONOMOUS BUCARAMANGA			1	0	1			Plagiarism	1	1	Material copied from multiple sources that fit well, even knowing how to do it, Include large passages of text from a single source without modifying them., Change key words and expressions without altering the essential content of the sources.	1		
SAN MARTIN UNIVERSITY FOUNDATION			1	1				Falsehood of information, academic fraud, phantom authorship	1	3	Include large passages of text from a single source without modifying them.	1		
UNIVERSITY OF THE COAST (CUC)			2	1				Total	3	3	Material copied from multiple sources that fit well, even knowing how to do it, Material copied from multiple sources that fit well, but out of ignorance for not knowing how to reference or did not know you had to do it., Change keywords and key expressions without altering the essential content of the sources.	1		
ITSA UNIVERSITY INSTITUTION			3	1							Include extensive text passages from a single source without modifying them, Change key words and expressions without altering the essential content of the fonts.	1		
METROPOLITAN UNIVERSITY			6	1							Present someone else's work as your own, copied word for word, but out of ignorance for not knowing how to reference or didn't know you had to do it., Material copied from multiple sources that fit well, but out of ignorance for not knowing how to reference or didn't know you had to do it., Mix paraphrased material extracted from multiple sources and make it look like yours., Change key words and expressions without altering the essential content of the sources.	1		

TECHNOLOGICAL INSTITUTE OF PIEDRAS NEGRAS	1	T ot al	33	Material copied from multiple sources that fit well, but out of ignorance for not knowing how to reference or did not know you had to do it., Mix paraphrased material extracted from multiple sources and make it look like yours., Change keywords and key expressions without altering the essential content of the sources.	1
POPULAR UNIVERSITY OF CESAR	1			Material copied from multiple sources that fit well, but out of ignorance for not knowing how to reference or did not know you had to do it., Include large passages of text from a single source without modifying them., Change key words and expressions without altering the essential content of the sources.	1
UNAD	1			Material copied from multiple sources that fit well, but out of ignorance for not knowing how to reference or did not know you had to do it., Change key words and expressions without altering the essential content of the sources.	1
SIMON BOLIVAR UNIVERSITY	1			Total	3
UNICORSALUD	1				3
AUTONOMOUS INDIGENOUS UNIVERSITY OF MEXICO	1				
TOTAL	3				3

Table 2. Correlation matrix on the importance and interest of training in scientific integrity and in which topics or courses.

	University / Corporation	What do you think is a matter or issue relevant to the integrity and academic or research quality at your institution?	Are there courses or other formal activities at your institution that address the following topics?	What type of internship you have had as a student in the course of your training	You Know If Any Professor Has Had Unethical Practices In Academia Or In Research	If your answer to the above question is yes, in what kind of practices you would pigeonhole it	You Know If Any Colleague Has Had Unethical Practices In Academia Or In Research
University / Corporation		0.742				0.359	
Sex							-0.331
What do you think is a matter or issue relevant to the integrity and academic or research quality at your institution?	0.742					0.403	
Are there courses or other formal activities at your institution that address the following topics?				-0.314			
What type of internship you have had as a student in the course of your training			-0.314		0.387		
You Know If Any Professor Has Had Unethical Practices In Academia Or In Research				0.387		0.437	
If your answer to the above question is yes, in what kind of practices you would pigeonhole it	0.359	0.403			0.437		

4. Discussion

Hirsch (2016) quoted by Rosales Cevallos describes: "Although all these factors are significant, we consider of special relevance the need to combat inadequate ethical education, based on explicit and systematic training strategies on professional ethics and ethics of scientific research in universities" [31]. In this sense, the results showed the interest of the students in the universities proposing educational programs to identify the types or modalities of plagiarism, among other topics such as phantom authorship, falsedad de Información, the fraude, among others. In addition, the importance that teachers also keep in mind this type of practice as an element of integral training to their students from the example, as also described by other studies. [12:30–32:48]. It was observed that scientific misconduct is not a matter of a single country or of universities if they

are public or private, but that they have some convergent points that need to be observed from a cultural component, educational and ethical level differentiating the ethical deviations from scientific misconduct [2], [3], [11], [12], [28], [46], [47].

5. Conclusions

Talking about ethics does not necessarily mean acting in accordance with it, but in the case of students it goes beyond knowledge and in this, the ethical relationship plays an indispensable role, projecting the quality of the teacher as a person, remembering that teachers are role models for students. The idea of focusing academic and scientific practices on episodes of misconduct is of importance to students. In addition, they emphasize the need to design a model for the analysis of complaints and sanctions for students, researchers and professors, but also related to the fact of stimulating them to attend to the highest standards of ethics in research and publication. Universities must publicly reinforce the value of the quality of research and in training in scientific and academic integrity.

Institutional acknowledgments

To the Nuñista Virtual Stay Program of the Rafael Nuñez University Corporation, Cartagena de Indias, Colombia, whose objective is the research training of students from different countries in all areas of knowledge.

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