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Resumen

Introducción: El periodismo científico es un área de especialización que se ocupa de la divulgación de la ciencia, en medios masivos, a partir de un proceso serio de investigación.

Objetivos: El objetivo de este documento es identificar el periodismo como eje de formación en la educación superior de Ecuador. **Metodología:** Es un estudio de campo que utilizó herramientas metodológicas de tipo cuantitativo (encuesta) y cualitativo (entrevista y análisis de contenido) para la recogida de la información, en las carreras de Comunicación Social de las universidades: Nacional de Chimborazo, Estatal de Bolívar, Técnica de Cotopaxi y Técnica de Ambato, y en los medios masivos de la región.

Resultados: Los resultados evidenciaron que la enseñanza-aprendizaje en periodismo científico le resta camino por andar, por la ausencia de una asignatura específica o por crear vínculos con organismos especializados en ciencia para sumar esfuerzos y que esto redunde en la importancia del área de especialización.

Conclusiones: No existe un antecedente investigativo sobre la temática que exponga con precisión si la universidad ecuatoriana y en concreto las Instituciones de Educación Superior del centro del país forman estudiantes desde ejes de especialización. Además, expone la proximidad a esta temática de los docentes como pieza clave en la enseñanza de periodismo científico en las carreras de Comunicación Social.

Área de estudio general: comunicación. **Área de estudio específica:** periodismo. **Tipo de estudio:** original.

Abstract

Introduction: Science journalism is an area of specialization that deals with the dissemination of science, in mass media, based on a serious research process. **Objectives:** The objective of this paper is to identify journalism as a training axis in higher education in Ecuador. **Methodology:** It is a field study that used quantitative (survey) and qualitative (interview and content analysis) methodological tools to collect information in the Social Communication careers of the following universities: Nacional de Chimborazo, Estado de Bolivar, Técnica de Cotopaxi and Técnica de Ambato, and in the mass media of the region. **Results:** The results showed that teaching-learning in science journalism still has a long way to go, due to the absence of a specific subject or to create links with organizations specialized in science to join efforts and that this would result in the importance of the area of

specialization. Conclusions: There is no research precedent on the subject that accurately exposes if the Ecuadorian university and specifically the Higher Education Institutions of the center of the country train students from axes of specialization. In addition, it exposes the proximity to this topic of the teachers as a key piece in the teaching of scientific journalism in the careers of Social Communication. General area of study: communication. Specific area of study: journalism. Type of study: original.

Introduction

It is necessary to link higher education with scientific journalism approaches for the purposes of this research; it is responsible for developing competencies in students framed in the components: cognitive, attitudinal and procedural; the action requires shared efforts between the State, business and institutions of the Ecuadorian Higher Education System. Interacting in new scenarios means moving the classroom to new learning environments that mean an inter-relation of experiences as an opening for new levels of training of students critical of the role they have and the new status they will assume. The importance of teachers in the training and improvement of learning cannot be ignored; as well as the approach to specialized sources or the collection of information.

A quality approach is not only essential for the training of students, but goes beyond that: it allows for the provision of theoretical and practical references for professional life. Evaluation is essential, not as a mechanism for assigning a grade with which to pass a semester, but as a thermometer to establish how much help the course was for future professional performance and for daily life.

The communication study identified the approaches, the role played by teachers, students and academic authorities, the level of specialization of people working in the media and the scientific proposal of one of the newspapers in the region located less than two hours from Quito, the capital of Ecuador.

Communication as a crossroads, relies on other sciences to explain social phenomena. From this perspective, to base the study, the proposals of authors such as: Bravo (2015); Bravo (2016); Calvo Hernando (1997); Cantarero (2002); Di Troccio (2009); Elías (1997); Gromis (1991); Piñuel (2009); Galindo (2018); Bolio (2012); Rizo García (2012); Wolfgang (2014); Lublinski (2011) were used.

Nowadays, journalistic activity linked to the dissemination of science is carried out in different settings and with its own characteristics. This work developed the theme:

Scientific journalism as an axis of training in higher education in Ecuador. It was evident that the training of students in this axis of journalism has limitations; first, because not all Higher Education Institutions (IES) considered a specific subject for this specialization in their curriculum; second, there are no links with organizations that facilitate the intermediation between academia and science; and third, there is a need - it is emerging - to generate awareness of the importance of journalists disseminating science in serious spaces and with academic training.

For the purposes of this work, the researchers asked themselves the following question: How has scientific journalism become a training axis in higher education in Ecuador? The answers showed that it is not just another subject in the curriculum, but rather about choosing methodologies and instruments for the dissemination of the results of scientific research and the frequency with which to do so; how to choose the research topic; its planning and obtaining information. A trilogy, in which the foundation is the cornerstone for an efficient praxis.

Scientific journalism was chosen as the object of study; this article was constructed, with the participation of students of the Specialized Journalism course, corresponding to the eighth semester of the UNACH Degree, during three moments: the first, based on teaching in the Social Communication degrees of the universities in central Ecuador: National University of Chimborazo, State University of Bolívar, Technical University of Cotopaxi and Technical University of Ambato; the second, the approach from the practice of professionals who work in mass media in the region; and the third, a qualitative content analysis of the Independent Regional Newspaper Los Andes.

The methodology used for this research was qualitative-quantitative; the study was field-descriptive. The techniques chosen were: a survey of 461 students, 12 teachers and 92 journalists from print media and television channels; interviews with four career directors; and content analysis of the publications of Diario Regional Independiente Los Andes, during March 2022. The instruments chosen: the questionnaire, the unstructured interview guide and the content analysis matrix (qualitative).

Information was requested on the level of knowledge about scientific journalism, the existence or not of a specific subject in the curriculum, the frequency of publication on these topics and the media chosen; and the levels of training. The results showed divided criteria around the axis of training, the field of action and the treatment in the media of the topics linked to science.

Approach from the theoretical

Education and communication: two axes and one axis

At the university, emphasis is placed on the development of teaching-learning methods in the process of knowledge appropriation, even more so when it links education with communication-journalism.

The appropriation of knowledge involves a process that is not exhausted in the institutionalization of knowledge. The knowledge that is acquired throughout life is useful because each human being is aware of his or her learning process and, furthermore, it is understood that this process is personal and not collective (Vivas-Herrera, 2015, p. 73).

The importance of teachers in the educational system is clear and, therefore, this activity must be considered as an important category for all times. It is impossible to deny the value it has, even if only as a guide for the construction of new human beings, actors of change. The teacher is a key player who plays a relevant role, not because of his or her different knowledge but because of his or her contribution to the learning of individuals.

It is for this reason that learning cannot be separated from quality teaching, since it is understood as a process that is carried out with quality; in these reflections based on a Chinese proverb which said: 'Give a man a fish and you will feed him for a day, teach a man to fish and you will feed him for the rest of his life'.

The knowledge or information society we are witnessing has drawn up new road maps that should make the passage through the educational system and the construction of knowledge that is the foundation for professional life more accessible.

When education is combined with communication, it is discovered that together they can change the chaos and restore order to the world, through a rational approach to scientific journalism content. In any case, investments in these activities deserve to be at least considered by public bodies and private companies, and the academy is not exempt from this.

Communication

Communication in this century is going through a major crossroads, and the current debate is focused on understanding whether it is a science; a discipline; a trans-inter and multidisciplinary axis? or a science under construction? This implies approaching it from different conceptual angles. Marta Rizo García (2009, p. 20) explains that communication, as such, is a polysemic term, which makes it possible to have multiple definitions that allow us to understand this complex social process.

However, she says that from the academic field, the communication phenomenon is supported by theoretical structures from Sociology, Psychology, Anthropology and Linguistics that go beyond mere concepts, to the extent that it is sought to give it the

category of science. Emilia Montes (1983, p. 15) assumes that it is necessary that as a science, Communication must find "its own, dimensioned field of reflection, which does not have to resort to external explanations, but rather generates its own explanatory terms." This author agrees with Rizo that communication is a complex phenomenon, a social fact; but that it is also a theoretically developed category and has to be defined as a process with elements, structure, relationships and dynamics.

Idalberto Chiavenato (2006, p. 110) states that it is "the exchange of information between people, which means making a message or information common. It constitutes one of the fundamental processes of human experience and social organization."

From Bolio's position (2012, p. 28), it is a transversal axis that crosses all human activity, that is, they are 'entities' that interact with others. Communication is, in essence, that system of emission, reception and transmission of messages or information through codes, signs that allow this communication process to take place between people in a social group; but communication is the process by which we exchange or share meanings through a common set of symbols.

From this approach, a new system of thought emerges for José Luis Piñuel (2009, p. 69) in which he understands communication as a cognitive resource that means "the essential capacity, first, to differentiate, and second, to unite from the social construction of the other."

This opens the way to a more complex and systematic proposal for communication that Jesús Galindo (2018, p. 36) understands from a constructive point of view, which implies that everything can be perceived and configured in the social environment by those who participate in the communication process.

The study of communication is closely linked to the concepts of social action and interaction, which Rizo (2012, p. 18) describes as "the set of ways of acting, thinking and feeling of the individual that, in turn, regulates and makes possible the interaction between people." The concept of communication should be presented as an organizing principle of nature through which people connect and interact with each other.

Galindo (2018) starts from a general definition of communication as a basic process for the construction of life in society, a kind of activating mechanism for dialogue and coexistence between social subjects. His argument focuses on the fact that communication is at a level of "constitutive dimension of the social", hence his analysis goes beyond mass media, so it should be seen as "the interaction through which human beings adapt their behavior to the environment through the transmission of messages, signs, symbols and common codes" (p. 55).

Communication has been conceived as the system of transmission of messages or

information, between physical or social persons, or from one of these to a population, through personalized or mass media, by means of a code of signs also agreed upon or fixed in an arbitrary manner.

Galindo (2018) insists that communication is not only an emerging need, but a lifestyle, a worldview, the heart of sociability; that is, it implies social interaction, being the basic principle, the essence, of society.

Communication is established as an emergent system in the process of civilization. Human beings become dependent on this emergent system of higher order, under whose conditions they can choose contacts with other human beings. This higher order system is the communication system called society (Luhmann, 1993; cited in Rizo, 2012, pp. 4-15).

For his part, Talcott Parsons (1966), cited by Jesús Galindo (2018), in his contributions has a clear and systemic vision on communication by emphasizing that it is present in all human activity and constitutes a fact with social objectives.

These postulates are reaffirmed by the statements that the term communication as a verb has two possible meanings to differentiate: The first from a transitive perspective of communicating, which is understood as informing, persuading and interpreting. And a second of a reflexive nature that communication before communicating is communicating; we then speak of sharing and dialoguing with others.

Meanwhile, to talk about journalism is to delve into the very history of man, into the exercise of such an old profession, little valued, criticized by those in power, which has forced it to be redefined and re-conceptualized from the academy, to be in tune with the knowledge or information society.

The new era —information society— has been evident since the 1960s, characterized by the need for human beings to coexist in a different type of society than the one they were used to. It privileges access to information generated by others and is a path of no return (Bravo, 2016, p. 233).

Journalism as a science and technology

Talking about journalism as a science and technique is breaking old paradigms to generate new ones, from an epistemological perspective:

Because it involves a method, an object of study, a product of human knowledge, the fruit of the desire to know more. And technique, because being the work of man, it assumes rules and norms of know-how in professional practice (Enebral & González, 2006, p. 8).

From the perspective of Gomis (1991), journalism can be considered as a method of successive interpretation of social reality that allows people to understand what is happening around them and adapt to it.

Journalism is, therefore, a method of interpretation, first because it selects from all that happens what it considers interesting. Second, because it interprets and translates into intelligible language (...); and third, because in addition to communicating the information produced, it also tries to situate and set the scene so that it can be understood, (p. 35).

Mario Cantarero (2002, p. 46) conceptualizes journalism as “the exercise or profession of the journalist, who was the person whose activity was writing for newspapers,” but it was surpassed several years ago, due to the various media that have been developed, the skills and abilities of human talent, in addition to the new technologies that have been incorporated.

However, from the perspective of Cantarero (2002, p. 92), journalism is not only about delivering news facts to audiences, but it is “the form of communication par excellence that contributes to the rapid development of ideas and the most important instrument for reforming society.”

Journalism in society has several functions to be analyzed and university faculty should emphasize and exercise self-criticism. The first and most basic is to inform the population about the most relevant events in their daily lives, which should not be addressed from ideological questions, but from a service perspective.

It is a complex task because historically the press appeared as a mechanism of service to capital, to politics, as a propaganda vehicle for exploiters and oppressors, and as an ideological apparatus of the State, with the aim of misinforming, deceiving and alienating the population, adds Cantarero.

A second function is to educate, which implies that journalism must be taken as an instrument that serves to enlighten society, by being permanently exposed in the streets in the form of newspapers, or inside homes through television or radio.

We must not lose sight of the guiding function that will allow the population to have a more formed opinion about what is happening in their social environment, and thus not be limited to the mere reception of news of any kind.

And one of the functions that the break with power has implied and that has earned journalism the category of counter-power is the task of supervising public administration. For Cantarero, this is a commitment of the independent press that contributes to the birth of investigative journalism.

Specialized journalism, a new discipline

The teaching of scientific and specialized journalism as a branch of journalism that, in turn, is derived from Social Communication has led to a debate on the need to establish: what is it?, what is its purpose?, its functionality? and its full exercise by social communicators?

After a thorough bibliographical research, the following lines will address various points of view and concepts on what should be understood by Scientific Journalism or Specialized Journalism; and, thus, determine whether the task is fully accomplished by the teacher.

In reality, there is no single definition of Scientific Journalism and it seems that the most appropriate one is based on a journalistic specialization, although Calvo Hernando (1997, pp. 27-30) conceptualizes it as “a discipline that studies journalism as a science (...) or an informative specialization that consists of disseminating science and technology through mass media.”

Once again the question arises: what should we call this journalistic specialization that is taught in the academy and the person who carries out their work in this journalistic specialization?

For Calvo Hernando (1997, p. 30), in short, it is "an informative specialization that consists of disseminating Science and Technology through mass media" and, at the same time, it is "a subsystem within journalism, which is integrated into the broader area of communication."

The reflection on Scientific Journalism is based on the idea that we are faced with information about knowledge, about the scope and work of science, and its inevitable dissemination to society, a stage that is presented as an inevitable category.

Hence, they point out the importance of scientific journalism, with quality information and service that plays a key role in enabling citizen participation in debates (consensus and dissent) and, where appropriate, in the control over those decisions, plans and scientific interventions that affect and impact the current configuration and future of a society.

This would mean that this type of journalism is the one that reports on scientific, technical and specialized topics using simple, understandable language, that is, reduced from the technical to the common so that understanding can occur.

Scientific journalism is an area of knowledge within communication that allows the scientific journalist to explain the social, political and economic events that occur as a result of scientific and technological advances (Calvo Hernando, 1997).

As a result of this discussion and the concepts expressed, scientific journalism must be understood as a social process that occurs between the journalist, through scientific and technological content, which is broadcast through the media (magazines, newspapers, television, radio) and the community, based on their cultural and ideological interests and expectations.

Being immersed in the world of science and technology, specialized or scientific journalism becomes more complex than when we talk about economics, politics or sports, areas with a greater tradition in the journalistic profession and which are taught in classrooms.

So, questions are being revealed and the need arises to affirm that journalistic work must have an angle not only of ethics and professionalism, but also of a broad specialization in various topics.

This means that the Social Communication courses and faculties need to work on training professionals who are specialists in a variety of subjects, who not only inform, educate, entertain, and supervise, but who also manage scientific knowledge, a task that is still pending in the university and must be resolved.

Methodology

The research obtained information on training processes in universities, the presence of scientific journalism in the curriculum, the level of specialization of practicing journalists and evidence in a newspaper on the object of study. The information gathering stage had three moments: the survey was used as a quantitative axis; and qualitative, through the application of a content analysis that abounds in characteristics and not in percentage criteria, and the unstructured interview. And, instruments such as the questionnaire, the interview guide and the analysis matrix.

Survey

Survey of students and professors at universities

First, the student population of the four Higher Education Institutions was established. 761 people with regular attendance from the first to the eighth semester; it was necessary to calculate the sample by applying a statistical formula; and then it had to be stratified so that the instruments to be applied were distributed according to the population of each university.

The results of the stratification were: 91 students from the Technical University of Cotopaxi, 78 students from the National University of Chimborazo, 57 students from the Technical University of Ambato and 35 students from the State University of Bolívar. 261 surveys were carried out. The collection instruments had 10 items; information was

required, among other aspects, on: knowledge about the subject, placement in the curriculum, training processes and orientation towards publishing works in mass media. In the case of teachers, only full professors were chosen and the questionnaire had a similar theme.

Journalism, as an intellectual activity that consists of collecting, classifying, transferring and publishing information in mass media, has a high level of specialization if it is linked to science (Bravo, 2012). This is the link between researchers and the object of study, as a foundation for the development of the activity carried out.

Survey of journalists from television and print media in the central region

To obtain information for this research, 92 journalists with academic training who work in mass media (8 television channels and 8 print media) based in Ambato, Riobamba, Latacunga and Guaranda were contacted. These cities are located in central Ecuador and are home to the universities where we worked with students, teachers and directors of courses. The decision was made to survey trained journalists because of the relevance of the topic and because a high percentage of them were trained in these educational centers. With the same category of relevance, due to the information provided and the content received during the training process, the year of graduation, the institution that awarded them the degree (national or foreign), public or private, were observed.

In order to carry out journalistic activity, it is necessary to observe that:

Writing about journalism is a delicate activity. We must be careful with the words we use because each one can be interpreted differently by the actors, according to their convenience (Kapusinski, 2005; cited in Bravo, 2012, p. 47).

Interview with race directors

At this stage, an unstructured interview was applied, which yielded qualitative data that demonstrated how academic-administrative decisions are made within the courses of the universities that were the subject of the research. A single instrument was needed for the four directors. Then, an instrument was developed that was divided into categories and indicators based on: curriculum requirements; selection of human resources for the corresponding course; physical spaces for the development of the course; available technological resources; agreements with public institutions and companies linked to science, for the realization of pre-professional practices; agreements with mass media for the same purpose.

Content analysis

Using a content analysis matrix, the presence of scientific publications was observed in 30 editions of the Independent Regional Newspaper Los Andes. The content analysis

matrix was applied to 30 editions of the printed media with regional circulation during September 2016.

Because this is a regional study, this medium with circulation in the cities where the four universities are based was chosen. It is necessary to clarify, as reflected in the results, that not everything published on science is produced by the media's in-house journalists: they are contributions from national and international agencies.

From what was obtained, the thematic axes frequently used in the printed matter are: production of technology, medicine, climate change, production of clean energy, and weapons development.

Discussion

During the three stages, the research obtained first-hand information on: Teaching of scientific journalism in universities in the central region of Ecuador; questionnaires were applied to students, teachers and journalists working in mass media; unstructured interviews were conducted with directors of courses; and a qualitative analysis matrix was used to obtain the data detailed below:

a) Student survey

To begin the analysis of results, emphasis must be placed on what scientific journalism means.

An informative specialization that consists of disseminating Science and Technology through mass media (...); and, a subsystem within journalism, which is integrated into the broader area of communication (Calvo Hernando, 1997, p.30).

The responses obtained indicate that the highest percentage has received training in the area and this will have an impact - as a preview of the conclusions - on their professional practice when they have to write or disseminate content on scientific topics. The IES of Cotopaxi (80%), Tungurahua (67%) and Chimborazo (63%), according to the students, do prepare them in this area of specialization. In Bolívar (89%) the response was negative.

The third item is linked, as if by an umbilical cord, to the publication/dissemination of works on scientific journalism in mass media. The No option prevails by its highest percentage (63% UNACH, 57% UEB, 69% UTEC and 80% UTA).

Those who answered yes to having published/disseminated scientific topics said they did so in the press (57%), and (26%) on the Internet using blogs. Less than 10% said they did so on radio and television; and the rest never.

Being immersed in the world of science and technology makes what is known as specialized or scientific journalism more complex than when we talk about economics, politics or sports, disciplines that have a longer tradition in the journalistic profession; however, the survey showed that students do (87%) identify topics on science, technology and innovation and are interested in exploring them.

This assertion implies that Social Communication courses should work on training professionals who are specialists in a variety of subjects that not only inform, educate, entertain, and supervise, but also manage scientific knowledge, a task still pending in the university and to be resolved; in this way, the requirement posed in the last question of the survey would be met. 87% of the responses asked that the subject of scientific journalism be included in the curriculum, as an option for professional improvement.

b) Teacher survey

The practice of scientific journalism demands deep and systematic knowledge that begins by freeing oneself from complexes and opening one's senses to a reality that cannot be understood. These feelings must be discussed during class so that students understand that scientific knowledge requires proof, generates discussions, raises questions, demands answers, requires results and makes uncertain what was accepted as valid yesterday.

From this point of view, the professors surveyed responded that they had knowledge of scientific journalism. The levels evidenced, on the other hand, did not exceed 60% in the four universities that were considered to investigate the object of study, which leaves a bad taste in the mouth when it comes to interpretation.

With almost the same results, in the answers to the second question it is indicated that they did receive training on the area of specialization, formally at the university or by participating in conferences, seminars, workshops, etc.

And finally, almost half of the respondents have had the opportunity to publish the results of their research in mass media. Teaching practice is more than a test tube or the work of a simulator; it is the preparation from theoretical diversity to practice, to ensure that at the end of a course all the skills required to practice the profession are obtained.

Reaching students through teaching requires the development of methodologies that guarantee that the process yields the expected results. Knowledge of scientific journalism is not enough, but rather the way to transmit it to students through a clear methodological system.

The methodology:

It is an essential process of the training process, because it constitutes the way, the form in which training is carried out. The main purpose of choosing an appropriate

methodology is for students to learn (Ortiz, 2015, p. 102).

c) Survey of journalists working in media in the region

Given the importance of the research, the instrument chosen to measure the criteria of professionals working in the media (television and print), in addition to the precision of data on the object of study, also provided information on their training. The answers to the categories when? and where? are pertinent because they identified the origin of the journalists who are linked to professional life and the decade in which they completed their studies: 54 percent graduated in the decade 2001-2010, that is, the knowledge they have for their practice is relatively contemporary than if, for example, they had graduated in 1980-1990. Degrees awarded by Ecuadorian universities prevail with 94 percent; the study centers are public 54 percent and private 46 percent.

The journalists surveyed said they had little knowledge (73 percent) about scientific journalism; and that, although 40 percent acquired it during their university education, it is no less true that they had to train themselves (29 percent), or attend courses (26 percent) or seminars (5 percent), to fill the gaps left by the absence of a subject in the formal curriculum of Social Communication courses.

Only 21 percent of journalists from the media outlets we worked with to prepare the article have published/disseminated information on science; and 29 percent are dedicated to responding to the general information criteria expressed in the current situation or in the media agenda. Those who did so chose print media (92 percent) and 8 percent television.

100 percent of the journalists surveyed suggested that scientific journalism should be included in their CVs as an area of specialization that can provide better opportunities for professional growth in practice.

And better opportunities equal exposure to the world of science.

The New York Times, however, was better able than local newspapers to quote scientists rather than officials, because the Times's specialized reporters had more contacts in the scientific community and more knowledge to handle the technical information supplied to them (Nelkin, 1990, p. 126).

d) Interview with course directors

In Ecuadorian universities, the directors of the Degree Program fulfill the functions of administration and management of academic activities; that is, it is not only about complying with and enforcing what the Organic Law of Higher Education establishes for the management of academic units, but also about ordering and organizing the spaces for learning, promoting adequate scenarios for students and teachers, linking it with pre-

professional practice environments to enable a first contact with the working life that will be found when formal instruction has concluded.

It is logical then to think that:

The most relevant change expected within Higher Education is the one related to the way of teaching, of organizing teaching and university educational activities, since it does not seem very logical that, in the world of satellite communications, where mobile telephony has reached every corner and access to cutting-edge technology is no longer a problem, teaching and training in the same is (Bravo & Varguillas, 2015, p. 273).

The reality is divided in the Higher Education Institutions in which the research was carried out, as 50 percent have a specific course on scientific journalism and the remaining 50 percent have not included it in the curriculum. This means an imbalance when students have to face professional practice in this area of specialization.

Regarding the physical spaces available at universities in central Ecuador, one third have everything necessary for performance, while 75 percent do not. This shows a kind of imbalance when it comes to developing in educational environments that favor learning.

The researchers noted a contradiction between physical spaces and technological resources: access to databases, sites for editing for radio and television, multimedia classrooms that allow virtual interaction with generators of scientific knowledge; all the directors of the Degree Course stated that they do have these. What happens then? They are used in other activities related to general information journalism and not in a specific area from which they could obtain greater benefit in the generation and dissemination of scientific knowledge.

When researchers say that benefits are academic, they are referring to the generation of scientific journalistic content that will be published in mass media: radio, television, press; and also on websites, making the most of the resources offered by the Digital Age. This last field has not yet been exploited as expected in Ecuador. Traditional media continue to be the majority when it comes to the dissemination of this type of topics.

Finally, what has been learned must be developed and the appropriate instance is the completion of pre-professional internships in institutions and companies that link the public with the private, thus transferring the student from the classroom to other performance sites, closer to the workplace. 25 percent of universities in the central region of Ecuador have agreements with organizations so that their students can put into practice what they have supported in theory in the classroom. 75 percent do have them. The objective of these internships? That journalists in training are part of the processes of generating scientific knowledge, have first-hand methodology at their disposal, access

laboratories, develop skills and abilities that the world of science proposes and that, due to the conditions of Higher Education, are not available in their universities.

In the case of agreements with mass media, the situation is different, since 100 percent of higher education institutions have spaces available for students and there, they regularly face the real world without having formally completed university instruction under the modality of re-professional practices.

From the results obtained in the instrument applied to the career directors, it can be anticipated as a conclusion that it is emerging to think that:

The traditional educational model has collapsed and this fact demands a change of focus in higher education, to move from the University of 'teaching' to the University of 'learning', from training by objectives to training by learning achievements, from teacher-centered methods to student-centered methods, from evaluation by results to evaluation by processes (Bravo & Palacios, 2003; cited in Bravo & Varguillas, 2015, p. 273).

e) Content analysis

Content analysis has an orderly and systematic methodical approach, seeking to achieve the proposed research objectives on the basis of a clear and precise formulation of the problem. The methodology used must be rigorous. Berelson (1967, cited in López Noguero, 2002) says that content analysis is a research technique that aims to be objective, systematic and qualitative-quantitative in the study of the manifest content of communication.

Based on this, the research developed on the teaching of scientific journalism had an important moment in qualitative measurement with content analysis as an instrument. The results observe the approach to topics on scientific journalism from five axes: medicine, climate change, technology, energy and armament. The recurrence in the publication of the subject is on weekends.

The decision to publish other types of content, far from general information, is aimed at weekends, periods in which people who buy printed materials have more time to devote to reading.

However, it should be noted at this point that not all topics published in the mass media are of their own production, due to a variety of aspects that are handled there.

In print media, in-house production is that carried out by the journalistic communication company; from the assignment of the topic previously discussed at the planning meeting, the assignment of sources, the transfer of reporting, the correction of style, the layout and the publication.

Among the main ones: the level of specialization of journalists; the investment required to develop scientific journalism, which, while contributing to increasing credibility compared to general information content; and the position in news agendas.

It is no secret that the media prefer to replicate the proposals of international agencies, prior to paying for the dispatches. This makes it cheaper for them. Four of the five topics come from agencies: EFE, AFP and Reuters. Content analysis is a set of methodological instruments, applied to what he calls discourses (contents and containers) that are extremely diverse and made visible by this work.

Conclusions

- This research has a high academic value; first, because there is no research background on the subject that accurately exposes whether Ecuadorian universities and specifically Higher Education Institutions in the center of the country train students in this area of specialization. Second, it exposes the proximity to this subject of teachers as a key piece in the teaching of scientific journalism in Social Communication courses. Because teaching is a pillar on which students must be taught to learn, if better results are expected.
- Although the ultimate goal of the courses at the Ecuadorian center is to graduate communicators and not journalists, communication is the macro and journalism is part of it; this is stated in the curriculum and in the curriculum redesigns in the process of approval by the Higher Education Council. In addition, journalistic activities are the first to insert new professionals into the labor market.
- Knowledge about scientific journalism acquired in courses, workshops, seminars - as shown by the results of the instruments applied to students and teachers - is not the same as receiving - in the academy - in a formal manner the foundation on this area of specialization that requires rigor. Neither is it the same to receive a specific lecture on journalism and science at the university, to practice in publications to pass it, than, in practice, to publish research on advances in science and technology through the media. These dichotomies find support in the responsibility required when considering the curriculum for the careers.
- Scientific journalism, as Gervais & Fleury (2011) point out, is learned step by step in learning and training facilities, and is based on research. Does the University of Ecuador have these environments? Well, learning must follow a pedagogy that will guarantee the content to be transferred through the chosen medium. It must be remembered that knowledge has rules that must be followed, and observed to achieve the expected results, remembering that there are people waiting to learn about the advances in science, technology and innovation.
- Today's journalism suffers from many dysfunctions, but perhaps one of the most serious is the increasing dependence of the media on a few sources that are also

invested with great authority. The way media culture operates also favors that the more these sources appear in the media, the more notoriety they acquire (Elías, 1997, p. 82).

Conflict of interest

The authors declare that there is no conflict of interest in relation to the submitted article.

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