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Research in University Students: Real Needs for the Implementation of a Formative Research Program

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Abstract

Research is an important part of professional education, development and improvement, whose results are observed in the socioeconomic development of a country. This is evidenced in the investment of resources made by developed countries to carry out this activity and the increase of their knowledge production. However, this situation is not the same in Latin America. Although the current legal framework recognizes the importance of research, its implementation process is still emerging. This encourages higher education centers to look for strategies to improve students' research skills during undergraduate and postgraduate studies. This study is aimed at making a diagnosis of the research awareness of the entrants to a private university in Lima as a starting point for the implementation of a future formative research program. Data were obtained from a 22 item Likert-type questionnaire with scores based on a 5-point scale applied to a sample of 193 selected students. Among the main findings, we identified a difference between the high interest in research and the low level of knowledge about its practice. Subtler results could be obtained by observing generational aspects (greater interest is expressed among younger ones) and the familiarity of Social Sciences and Humanities students with tools related to scientific writing.

Keywords

Research; University; Research Organization; Innovation; Model.

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Introduction

Scientific research is one of the pillars for the comprehensive training of university students and their relationship with the academic environment (Gutiérrez & Mayta, 2003; Romero & Barrenechea, 2017; Pinnegar & Quiles-Fernández, 2018). Therein lies a group of initiatives associated with improvement in the quality of education; the need to produce, spread and incorporate knowledge; the possibility to find solutions to social problems from a scientific and humanistic perspective; and the training of professionals that can produce knowledge or, at least, act with sensitivity towards this process (Aldana de Becerra, 2012). In this regard, the importance of higher education in the trinomial "science, technology, and innovation" is recognized (CTI) (Guerrero, 2017).

This hypothesis about the leading role of research is frequently expressed in the proposals made in this respect by international organizations, mainly when they refer to the dimensions that occur at a global level such as sustainable development, interaction with native communities, growth and innovation, among others. As far as that is concerned, the fact that developed countries give financial management and develop budgets to conduct research has become evident. For example, during the last ten years, China has increased its investment in this area from 0.56% to 2.11%; Austria, in the meantime, went from 1.58% to 3.09%. Both of them have followed the example of the United States and Japan which, despite having high indicators, have continued increasing their levels towards 2.74% and 3.15% respectively (UNESCO, 2015; World Bank, 2019). Another considerable indicator is the increase in the production of scientific articles during recent years: from less than 1.2 million in 2003 to more than 2 million in 2016 (World Bank, 2019). All these changes confirm the importance of acquiring new knowledge in increasingly changing competitive scenarios.

Even though such initiatives are plausible in countries that lead economic and technological development, their correlation in emerging nations continues to be discrete. In Latin America, only Mexico dedicates 0.5% of its GDP to research, followed by Chile with 0.36%. The other countries of the region are below these indicators (World Bank, 2019).

From an epistemological perspective, Morin (1999) states that education has not conceived any reform of thought in conjunction with reflection on the idea of reform

itself where the capacity for educational innovation could not be increased with great freedom, autonomy and empowerment. Similarly, Freire (1975) argues that there should be a need for a humanist and liberating pedagogy by which the individual understands his reality in a critical, responsible and participatory manner. For these reasons, a profound multi-dimensional change in research methods, which favors a transformation of education and a revolution of mental structures, is a must.

For the aforementioned, the disadvantage in Latin America should not only be neutralized with geopolitical indicators, but also with the development of quality research awareness (Mårtenssona, Fors, Wallinc, Zander & Nillssone, 2016; Xiao & Watson, 2017; Staley, 2018); that is, with the incorporation of research into every activity of the human being. The benefits of research not only increase knowledge, but also demonstrate an improvement in students´ training, as well as an optimization of the processes of a specific group (enterprise, institution, community or country) and a better technological development (Nind & Lewthawite, 2018; Sarauw, Degn & William, 2019). In this regard, although novel science is restricted to a few environments with greater resources, every single research is inherently valuable (Restrepo, 2003; Sigurdardottir & Puirola, 2018; Escudero, 2019; Veugelers & Wang, 2019).

If we considered quantity, quality, variety and promotion of research in a Latin American environment, it would be easier for the community to understand its educational, scientific, and social benefits (Aldana de Becerra, 2012). Therefore, it is important to take advantage of the possibilities that the new university laws of these countries are offering for the production of research. Similarly, the initiatives could be based on a legal framework so that it can receive support from the institutions responsible for the production of knowledge.

For example, the Peruvian University Law puts research before everything because it is considered as one of its pillars. This is observed in the election of academic authorities with experience in research; the approval of uniform wages among researchers and congressmen; the implementation of research units and the report of activities in this area of knowledge (Congress of the Republic, 2014; 2019). A similar case can be observed in the Higher Education Organic Law, promoted by the Ecuadorian government whose spirit reflects the desire that teachers enjoy their rights to research in the broad spectrum of their interests: environment, social development, literary creation, etc. (Presidency of the Republic, 2010; 2018*)*. Finally, the law on

Higher Education, promulgated in Chile, highlights that higher education should be based on the principles of training, academic freedom, and creation of new knowledge (Ministry of Education, 2018). All these laws, which have been recognized during the last decade, should be categorically reflected within each university in order to strengthen the institutional symbiotic relationship between knowledge and society in general.

After observing the quantity and quality dimensions, promotion, and framework of legal research, it is evident that the need to strengthen this activity in higher education centers is of great importance. That is, to conduct research through phases or intervals that develop and reinforce the students´ skills in relation to this activity.

The first of these phases corresponds to formative research which is focused on training students to conduct research though research itself (Miyahira, 2009). However, the second phase, which deals with the number of abilities required to develop scientific and technological activities successfully, is related to research training in a strict sense (Guerrero, 2007). In both phases, research skills are developed through different resources and methodological procedures and the consolidation of objectives (Granados, Landazábal, Hernández, Ruíz, & Vanegas, 2007).

The development of programs using formative research specifies the link between research and the institutions in charge of the production of knowledge. Therefore, it would be very important to create scenarios for learning by discovery and construction in contrast with learning by reception of knowledge (Restrepo, 2007). Learning by discovery, which is typical of formative research, represents a constructivist position that claims that the person participates in cognitive (attention, memory, perception), affective (emotions, feelings), and social (interaction) processes as the result of an own construction (Cerda, 2007).

Because of the complexity of the processes involved, the cognitive process is seen as a starting point, putting emphasis on a bio-cultural process. This process consists of the recognition, interpretation, and analysis of the importance of incentives for the development of opinions. Ideological and cultural referents, which reproduce themselves and explain the facts of reality, are also part of this process. Likewise, they are applied to everyday experiences so that they can be easily arranged and transformed. Another important element in perception is the recognition of everyday experiences that allow one to recall previously acquired experiences and knowledge as benchmarks for the incorporation of new experiences. (Vargas, 1994).

The way in which the students perceive and know about the details related to research will allow them to manage their competitiveness in the long term, promoting skills to produce and use knowledge (Guerrero, 2002; González, Galindo, Galindo & Gold, 2004; Miyashiro, 2009; Alvitres, Chambergo & Fupuy, 2014).

The implementation of good practices in formative research will develop students´ willingness to analyze and solve problems based on scientific knowledge, that is, to approach the state of the art (knowledge), apply methodologies (procedures), and achieve collaborative and autonomous learning (attitudes). Consequently, this will be expressed in their professional lives through social, economic, political, and technological transformations (Barreiro, 2015; Rivadeneira & Silva, 2017; Gavilánez, Cañizares & Cleonares, 2016).

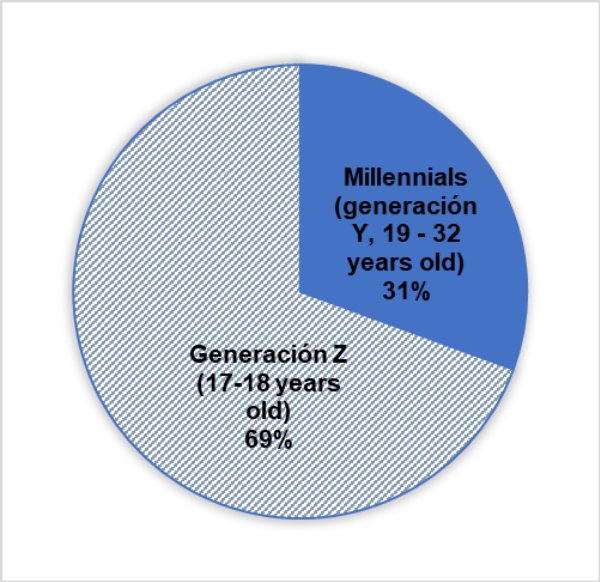
In short, the general objective of this study is to identify students´ perception of activities related to formative research in a group of novel students in a private university in Lima. The specific objectives are: first, to carry out a situational assessment to identify these activities and perspectives; second, to explore the recognition of activities related to scientific writing and tools for searching information considering the generational group, the areas of knowledge and the curriculum. A descriptive evaluation of the aspects presented here will contribute to the establishment of the first step that is unanimously demanded by international organizations and developing countries and the professional solvency that university students must acquire. For this reason, we consider that the approach addressed is appropriate for the present proposal.

Method

To conduct this study, a quantitative paradigm aimed at explaining facts in an objective way through the measurement of variables was applied (Pérez, Galán & Quintanal, 2012). From this paradigm, the methodology was based on the construction of dimensions and indicators of the study variable (Tamayo, 2009). In that sense, we carried out procedures for obtaining data on perception of research in first year university students. Data collection was performed using a questionnaire to gather primary information. The study participants were between 17 and 32 years old. For the analysis, two generations were classified according to age group: millennials and Generation Z. In the first group, the participants were born between 1980 and 2000 and,

in the second group, participants were born from 2001 on (Sao & Tolani, 2018) (see Figure 1).

Figure 1. Distribution of students by generations



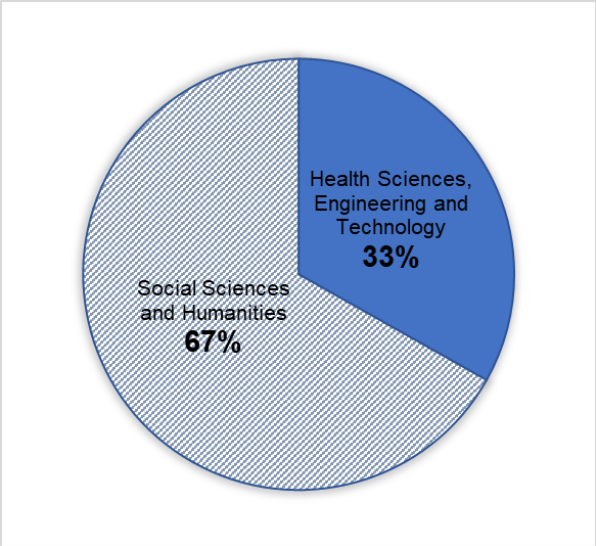
Note: *Although the sample is composed of students admitted to the university during the same year of studies, age diversity is evident. In Peru, high school students, in most of the cases, finish these studies between 16 and 17 years of age (INEI-Peru, 2018). Many graduates in this educational level continue their university studies immediately after graduation (generation Z)*

Population and sample

The sample was composed of 193 students, and the population was 2717. All of them were enrolled in a multidisciplinary subject that includes general studies taught in seven faculties in a private university in the city of Lima, Peru.

To carry out the analysis and present the results according to areas of professional training, we took into account the Field of Science and Technology of the Organization for Economic Cooperation and Development (OECD) used by the National Council of Scientific and Technological Development (CONCYTEC) in Peru (OCDE, 2007). Therefore, the seven faculties included in this study were organized in two fields of knowledge with a basis on the classification established by the OECD. The first area is composed of Health Sciences, Engineering and Technology; the second area includes Social Sciences and Humanities.

Figure 2. Distribution of participants by areas of knowledge



Note: *According to OECD classification (2007), Social Sciences also include the Sciences of the Company: Administration, International Business, Economy, Marketing, etc. The table shows that 67 % of the sample is composed of students of the field of Social Sciences and Humanities (including four faculties), while the remaining 33 % is made up of students of the fields of Health Sciences, Engineering and Technology (including three faculties).*

Instrument

A Likert-Type scale questionnaire, which included 22 positive statements in relation to the perception of activities related to formative research, was used to gather information. These statements were organized in two dimensions: the first dimension is the assessment of research situations and perspectives; the second one deals with the recognition of activities related to scientific writing and tools for searching for information.

Validity

The content validity of the instrument was supported by experts' criteria and evaluated by 6 judges. According to Martínez (2005) & Martínez, Hernández & Hernández (2006), it is defined as the degree in which the pool of items that was developed for the instrument represents a relevant and representative sample of the construct that will be measured. In addition, Escurra (1988) states that in groups of 5 and 7 judges, a complete agreement between experts is needed for the item to be valid. In the questionnaire, Aiken´s V coefficient was 0.9. Similarly, coefficients were obtained according to the dimension and category evaluated by experts. (see Table 1)

Table 1. Content validity of the research instrument. Statistics

Category *Dimension*	*Coherence*	*Relevance*	*Clarity*	*Total*
Judment/Assessment	0.9	1.0	1.0	1.0
Recognition	1.0	0.9	0.9	0.9
Total	0.9	0.9	0.9	0.9

Note: *Experts´ observations which emerged from very specific modifications regarding the categories evaluated were taken into account.*

Reliability

The questionnaire was applied only once. The calculated value of reliability coefficient was 0.885 (see table 2)

Table 2. Instrument reliability. Statistics

Cronbach´s Alpha	Cronbach´s Alpha based on standardized items	Number of items
0.89	0.88	22

Note: *When Cronbach´s Alpha values vary between 0.70 and 0.90, we consider that the internal consistency of the research instrument is good (Oviedo & Campo-Arias, 2005); therefore, the coefficient obtained allows us to conclude that the questionnaire applied is reliable.*

Factor analysis allowed us to confirm the two dimensions of the study variable, which was previously established in the work carried out to collect information: assessment of situations and research perspectives (seven items), recognition of activities related to scientific writing and tools for searching information (fifteen items).

With regard to the results of factor analysis, it is established that, when the value of the KMO test (Kaiser, Meyer & Olkin) approximates to the unit, the relationship between the dimensions of the variable is high. Moreover, if KMO $\geq$ 0.9, the test is very good; notable for KMO $\geq$ 0.8, medium for KMO $\geq$ 0.7, low for KMO $\geq$ 0.6, and very low for KMO < 0.5. Consequently, the relationship between the two dimensions of the study variable is remarkable in this research work, considering that the KMO value was 0.853 (see Table 3).

Table 3. Factor analysis: KMO and Bartlett´s test

Kaiser-Meyer-Olkin test for sampling adequacy		0.853
Bartlett´s test for sphericity	Aprox. Chi-square	2118.016
	gl	231
	Sig.	0.000

Note: *If the variable dimensions are not correlated, Bartlett´s test for sphericity must have a level of significance higher than 0.05. In this research, the level obtained is lower than 0.05; in other words, it is 0.000. It implies that the data analyzed are valid and the dimensions of the variable are correlated.*

Data collection and analysis

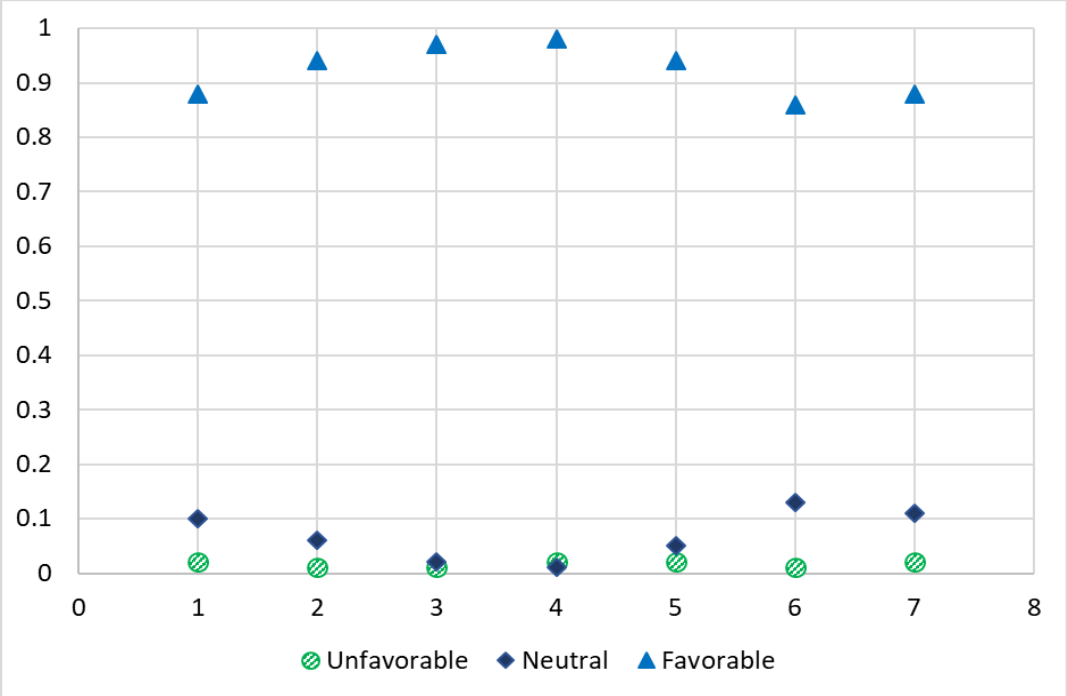
The administration of instruments was collective and conducted under the oversight of a principal researcher. The participation of the students was voluntary and anonymous. Before the implementation of the instrument, participants were given a written informed consent document which was signed by all of them. Research aims were explained, affirming that the data would be analyzed without any individual identification and that the treatment would be confidential. The evaluation was carried out in places, data, and schedules previously agreed by the team of researchers and the direction of the academic program, taking into consideration the basic physical conditions to fulfill this task (desk, chairs, proper lighting, moderate levels of noise and privacy).

Results

In this section, we present the results obtained from a survey that included 22 items which were applied to the students that composed the sample for this study. The survey was organized in two dimensions. The first dimension represents the students´ assessment in a favorable sense (agree or totally agree), neutral (undecided) or unfavorable (not in agreement or disagree) with the activities of formative research. The second dimension represents the results of knowledge evoked with regard to practices or experiences related to scientific writing and tools for searching information at three levels: high, average or low.

Dimension of perception: Assessment about the situations and research perspectives.
It is observed that most students´ attitudes are favorable. On average, more than 91 % of them agree to participate in activities of formative research. (See Figure 3).

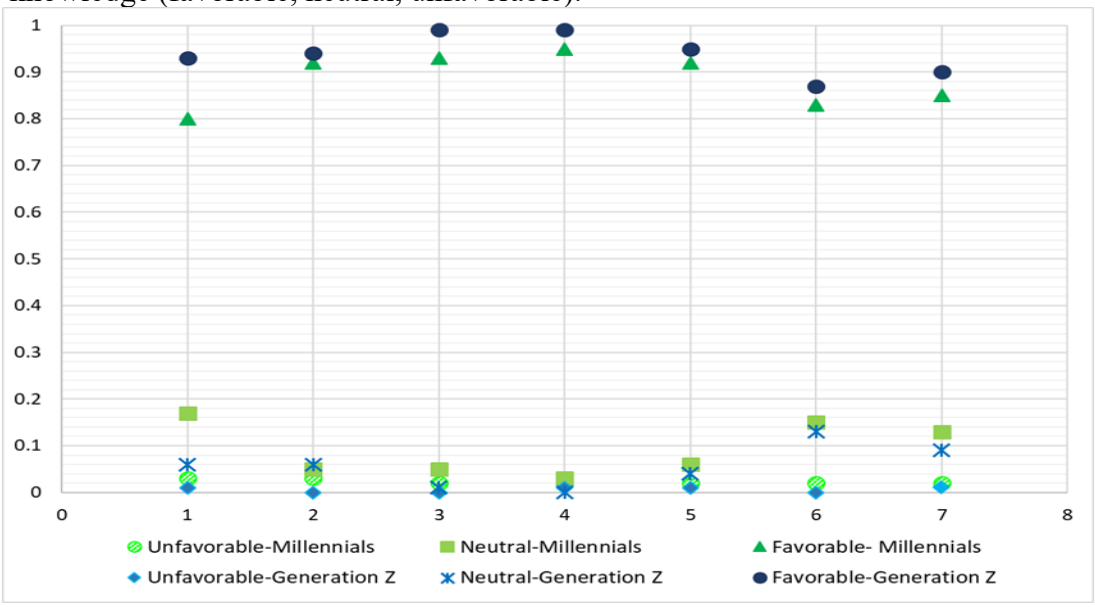
Figure 3. Participants´ Assessment of research situations and perspectives.



Note: *The seven items are: 1. The use of citation is important in the development of a text; 2. Research contributes to the development of a country; 3. Research is important in the process of academic training; 4. Research will contribute to university academic performance; 5. Research could improve their professional work performance; 6. Research could contribute to the improvement of their future remuneration; 7. The university contributes to the teaching and training of abilities linked to research.*

The assessment of situations and students´ research perspectives, which has been organized by areas of knowledge, also shows favorable results. It is observed in 94 % of students from the fields of Health Sciences, Engineering, and Technology; and in 91 % of students from Social Sciences and Humanities (see Figure 4)

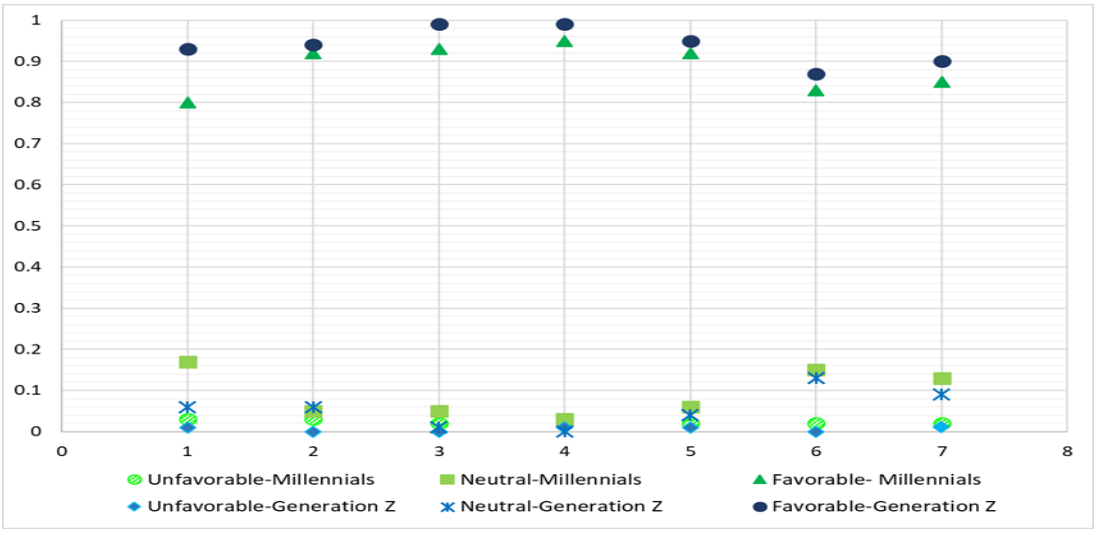
Figure 4. Assessment of the situations and research perspectives according to areas of knowledge (favorable, neutral, unfavorable).



Note: The areas of knowledge belonging to the fields of Health Sciences, Engineering, and Technology (HS, E and T) and Social Sciences and Humanities (SSCC and HH) present information about the seven items that make up students´ assessments about situations and research perspectives.

Regarding generational assessment related to situations and research perspectives, it is observed that 94 % of Generation Z shows a favorable assessment. A similar case is the 88 % positive vision of millennials towards research situations. This 6 % contrast duplicates the differences with regard to the areas of knowledge (see Figure 5)

Figure 5: Assessment of the situations and research perspectives by generations: Millennials and Generation Z (favorable, neutral or unfavorable).



Recognition dimension. Recognition of activities related to scientific writing and tools for searching information

Although the assessment is preponderantly positive, the level of knowledge offers several results. So, it is observed that, in the majority of the elements used for this purpose, there is an average level of recognition of activities related to scientific writing where the student expresses partial recognition of the activities related to research. However, when referring to the use of software, the level of recognition is low (see table 4).

Table 4. Recognition of activities related to scientific writing

Scientific writing activities	Average	Sig. (0.05)
Scientific Method	3	0.096
Database to gain access to studies, investigations, and other scientific documents	3	0.733
Text citation using a standard method (for example APA, Vancouver, among others)	3	0.947
Use of a citation management software (for example Zotero, Endnote, Mendeleyev and others)	2	0.721
Techniques and strategies for critical reading	3	0.652
Techniques and strategies to plan and structure a text	3	0.156
Techniques and strategies to write a text	3	0.466

On the other hand, it is observed that in five of the seven items related to tools for searching information, the average level of recognition of these tools is low. This means that the students have a poor knowledge or are unaware of the tools listed in the items presented in this study. However, it should be noted that they have an average level of knowledge about the items related to Google Scholar and APA citation styles (see table 5).

Table 5. Recognition of tools for searching information

Tools for searching information	Average	Sig. (0.05)
EBSCO	2	0.804
PROQUEST	2	0.330
SCOPUS	1	0.233
WOS	2	0.962
SCHOLAR	3	0.646
APA	3	0.716
VANCOUVER	2	0.309

Concerning the recognition of activities related to scientific writing, the average number of participants show that they have partial knowledge of them. Only in the case of citation management software, the average number of participants demonstrate a poor knowledge of this resource. No significant distinctions are observed in the recognition of the areas of knowledge among different groups. Nonetheless, we could highlight that Social Sciences and Humanities students express that they are acutely aware of the different techniques to structure and write a text (see Table 6).

Table 6. Recognition of activities related to scientific writing by areas of knowledge

Activities related to scientific writing	Health Sciences, Engineering and Technology	Social Sciences and Humanities	Sig. (0.05)
Scientific method	3	3	0.096
Database to gain Access to studies, investigations, and other scientific documents	3	3	0.733
Text citation using a standard method (for example APA, Vancouver, among others)	3	3	0.947
Use of citation management software (for example Zotero, Endnote, Mendeleyev and others)	2	2	0.721
Techniques and strategies for critical reading	3	3	0.652
Techniques and strategies to plan and structure a text	3	4	0.156
Techniques and strategies to write a text	3	4	0.466

The average recognition of tools for formative research by the surveyed students is low. This result is presented on a similar basis in both areas of knowledge. However, the group of Social Sciences and Humanities students report that they have a partial knowledge of Google Scholar and APA citation styles (see Table 7).

Table 7. Recognition of formative research tools by areas of knowledge

Tools for searching information	Health Sciences, Engineering and Technology	Social Sciences and Humanities	Sig. (0.05)

EBSCO	2	2	0.804
PROQUEST	2	2	0.330
SCOPUS	1	2	0.233
WOS	2	2	0.962
SCHOLAR	2	3	0.646
APA	2	3	0.716
VANCOUVER	2	2	0.309

On the other hand, there are no significant differences between the recognition of activities related to scientific writing in the information obtained from the two generational groups. Both of them express a low level of recognition in most of the items. However, in the item about the use of citation management software, both millennials and Generation Z students report having a poor knowledge of this tool. Furthermore, Generation Z students express that they are acutely aware of the strategies and techniques to structure and write a text (see Table 8).

Table 8. Recognition of activities related to scientific writing by generations

Scientific writing activities	Millennials	Generation Z	Sig. (0.05)
Scientific method	3	3	0.873
Database to gain Access to studies, investigations, and other scientific documents	3	3	0.725
Text citation using a standard method (for example APA, Vancouver, among others)	3	3	0.107
Use of citation management software (for example Zotero, Endnote, Mendeleyev and others)	2	2	0.922
Techniques and strategies for critical reading	3	3	0.315
Techniques and strategies to plan and structure a text	3	4	0.793
Techniques and strategies to write a text	3	4	0.683

The average result of the recognition of tools for formative research by generational groups demonstrates that both millennials and Generation Z students have a poor knowledge of computing resources to carry out research. However, millennials report having partial knowledge of the APA style. (see Table 9)

Table 9. Recognition of formative research tools by generations

Tools for searching information	Millennials	Generation Z	Sig. (0.05)
EBSCO	2	2	0.540
PROQUEST	2	2	0.776
SCOPUS	2	2	0.486
WOS	2	2	0.052
SCHOLAR	2	2	0.106
APA	3	2	0.523
VANCOUVER	2	2	0.508

These results demonstrate that there is an important contrast between the assessment of formative research (up to 94 % approval) and the level of knowledge about the use of research tools expressed by the groups (from low to average level). On the other hand, the findings about the type of knowledge acquired during school years according to areas of knowledge, the management of scientific writing, and the use of database searcher engines points to the need to look further into a discussion, which should be of use for other studies and performances.

Discussion and conclusions

In addition to the high acceptance observed in both specialties, the difference observed in the recognition of activities associated with scientific writing stands out. In both cases, Social Sciences and Humanities students have a better knowledge of the techniques for structuring and writing a text and ideas about the use of Google Scholar and management of the APA citation style. It should be noted that, until the date of admission to university, the curricula proposals that the students develop in both areas are similar (Ministry of Higher Education, 2016). Therefore, we can confirm that there is a relatedness between the mentioned group and scientific writing, which goes beyond the level of formal education.

This is a remarkable finding since the greatest scientific production in research areas in Peru is observed in the group belonging to the fields of Health Sciences, Engineering and Technology, with about three times its counterpart (CONCYTEC, 2017). Thus, the initial advantages identified in Social Sciences and Humanities students could potentially be strengthened through different forms: formative research stage, comparison of motivations to develop research projects in the field (FONDECYT, 2019) and promotion of scientific journals with more constant publication. About this point, Caballero, Macedo dos Santos & Trzesniak (2017) have

reported several practices that favor the publication of scientific articles of the so-called "hard sciences" (Engineering, Exact Sciences and Earth Sciences, Biology, Health Sciences) and Health Sciences (Nursing, Physical Education, Phonoaudiology, and Collective Health). However, the attention to problems of social importance given by the unit composed of Humanities and Social Sciences is also important for a better communication and coverage (Carvalho & Manoel, 2006).

On the other hand, even when the students have encountered problems with the quality of information due to lack of knowledge about valid sources (Veiga del Cabo, 2003), the results of this study demonstrate that 80% and 96% of them recognize EBSCO and Web of Science as the main search engines used. In some way, the informal access to these databases (borrowed access codes or copies from disks) have enhanced its international recognition (Ospina, Herault & Cardona, 2005).

Currently, the use of databases is the way to access scientific and technological information. Thus, for Sígales (2004), the students´ decisions concerning the selection of a database search engine include different aspects: the objectives of the course, students´ characteristics and needs, and the role of the teacher. Besides, Ospina, Herault, & Cardona (2005) state that databases are essential to improve understanding of a specific topic, define research objectives, develop methodological strategies, and interpret results. So, it is possible to provide trainings for their use through educational programs about strategies for information search, management of databases, and activities related to the access and use of information (Chaparro-Martínez, Álvarez-Muñoz & D'Armas-Regnault, 2017).

Finally, the generational aspect should be noted. This type of classification follows observable historical patterns in such a way that they offer a powerful tool for the prediction of tendencies (Howe & Strauss, 2007). One of the representative characteristics of millennials and Generation Z with regard to production and dissemination of knowledge is that the former tend to share information produced by the latter. Although Generation Z students express a predominance of visual skill over the written one (Matesanz, 2015), their attitude towards the management of strategies for text writing makes reference to the productive character of this group.

In addition, the use of the APA citation style, prioritized by millennials, makes reference to the preference for written texts in this generation. The use of a writing

style suggests a disposal of the way the build-up of information is developed, but not to the productive character of the group.

Both generations report having poor knowledge on the use of search engines and specialized software for research activities. This is interesting mainly when it comes to Generation Z, a group that developed skills to access and make visible up to five resources focused on different objectives at the same time: while millennials are focused on having access to information or carrying out activities that allow them to obtain or achieve social recognition, Generation Z students who are characterized by immediateness, are focused on personal success. Therefore, a program using formative research should consider the objectives stated in order to make use of these abilities.

The problems related to the specialty, the use of databases, and the generational characteristics, are relevant contributions to design a complex and multidimensional program using formative research. By recognizing the population, the most effective teaching forms that will appreciate the advantages of research in its widest sense are also recognized. All behavior focused on this purpose is intended to reduce the gap existing between emerging countries, from the educational sphere to the social, economic, and productive ones.

The teaching and learning of scientific research in undergraduate courses involve pedagogical discussion about different aspects such as motivation, favorable or unfavorable conditions and situations for educational training, institutional capacity, and the way in which research is represented in university. We can state that formative research is essential for the training of professionals with critical thinking and capacity for learning and doing research in order to find solutions to unsolved problems, which are important characteristics required by the professionals of the country.

Regarding the generational aspect, this type of classification follows observable and historical patterns offering a powerful tool for trend prediction (Howe & Strauss, 2007). In this regard, one of the representative characteristics of millennials and Generation Z with respect to the production and dissemination of knowledge is that the former tend to share information produced by the latter. Although Generation Z students show a predominance of the visual elements over the written ones (Matesanz, 2015), their willingness to manage strategies to write a text relates to the productive character of the group.

Unlike the productive nature of the Generation Z, millennials have the adoption nature. Proof of this is the fact that the latter resort to the APA style as a stable way of

finding a guide for their papers. Although they are characterized by being more moderate in the production rate, their affinity with the way to write the proposal is quite clear.

As for the use of search engines and software specialized in research activities, both generations report having little knowledge. This is remarkable, especially in Generation Z, a group that has developed the ability to access and make visible up to five resources at once, focused on different objectives; while millennials are focused on accessing information or conducting activities that allow them to achieve social recognition, those of Generation Z are characterized by immediacy and are focused on personal success (Zabala, Marcano & Chávez, 2013). Therefore, a research training program should pay attention to the objectives observed, so that a genuine dialogue can be established between digital skills (used to have access to information sources for own objectives) and research skills (search, selection, organization, analysis, systematization and communication of relevant information, review and treatment of different sources, recognition of scientific knowledge, among others) (George & Salado, 2019). The students´ conditions and perspectives are a real opportunity to develop research training programs based on the relevant use of information and communication technologies.

The points of view related to the specialty, the use of databases and the generation characteristics are relevant inputs to design a complex and multi-dimensional research training program. By recognizing the population, it is also recognized that the most effective ways of teaching are also those that will obtain the benefits of research in the broad sense of the term. All actions aimed at this purpose have, as a background, the reduction of the gap between developing countries, from an educational aspect to social, economic and productive aspects.

Finally, the process of teaching and learning scientific research in undergraduates involves a pedagogical discussion of different aspects: motivation, favorable and unfavorable conditions and situation for the educational exercise, the institutional capacity and the way in which research is represented in the university. It can be said that research is essential for the training of professionals, with critical thinking and capacity for learning and searching for solutions to unsolved problems as important characteristics required by the professionals of the country.

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