Research Article

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Attitude Index Towards Scientific Research in Peruvian Students of Education

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Abstract

The attitude towards scientific research is an indicator of educational quality in university education, being fundamental to consolidate every profession as a science. The objective of this study was to describe the attitudes towards scientific research of Peruvian students of the professional career of education. The research approach was a basic, quantitative, non-experimental design. The sample consisted of 494 university students. A sociodemographic form and the Research Attitude Index were used as instruments. The results show that students have a low attitude towards research. Likewise, they have a low level of self-evaluation; teaching influence and institutional influence of research capabilities, and students do not know if the university promotes the development of scientific production and do not know if the scientific training in their academic program is adequate. It is concluded that it is essential to promote greater visibility of the instances that develop research, also, teachers should have the pertinence of knowledge and experience to motivate a favorable attitude towards research.

Keywords: *Scientific research; Attitude; Higher education; Education; Attitude*

1. Introduction

The purpose of scientific research is to carry out exhaustive inquiries on the needs of society and to awaken the interest of the researcher to provide solutions to problems in the scientific, humanistic

and technological fields (Corona, 2016). A fundamental space for the development of research is higher level institutions (Rojas et al, 2020), where strategies to stimulate research, consolidation of networks and international collaboration are planned (Gotuzzo et al, 2010). University scientific research will fulfill its purpose when it applies scientific rigor in its development (Casadevall and Fang, 2016; Reichlin et al. 2016), which is why it is essential that research is developed in the curricular and extra-curricular training of higher education students (Hernández, 2018), since they provide opportunities for the acquisition of knowledge and development of society (Loli, 2015).

According to world reports on scientific production, among Latin American universities, Brazil is the country that develops the most research, followed by Mexico, Argentina and Chile (Información Tecnológica, 2011). In Peru, according to the I National Census of Research and Development to Research Centers, little development of research and technological development was found at the national level with respect to other Latin American countries (Concytec, 2017). Likewise, according to data from bibliometric studies Peru ranks fifth in South America when referring to international collaboration (Turpo et al. 2021). In a study conducted with Peruvian students, they refer that they have little knowledge about research, but would like to know more and participate in the development of studies within universities (Hernández et al., 2021). This could be due to the fact that undergraduate teaching processes do not prioritize research competencies in formative research to ensure students' professional practice (Gálvez et al., 2019).

Therefore, it is of great importance that the development of scientific research during undergraduate education should have priority as a formative part of all university students. On the other hand, it can be noted, that these demands have an impact on the concern of teacher training students, they must develop the skills and knowledge to conduct appropriate scientific research (Moreno et al 2021). Rubio et al, (2015) indicates that students should develop their collaborative work competencies and reflection through research. Veloso et al (2019) conclude that more than 90% of students indicate that training in research skills will be very useful in their professional performance.

In recent years, scientific research has been acquiring higher levels of demand in Peruvian universities, these quality conditions were raised in the current University Law 30220 (Medina, 2018), aiming to raise educational levels and create ideals in students so that they can watch over society and collective development (Casalino, 2017; Tolbert et al, 2018). The university educational reform in Peru, allowed the creation of the National Superintendence of University Education (SUNEDU), an organ of control of educational quality in universities, among its evaluation requirements, is scientific research, that is to say that universities must encourage and guarantee research processes in students and teachers, this has generated that universities require scientific production as an elementary part of the processes of graduation, graduation and obtaining degrees (Cervantes et al, 2019; Rodriguez and Morrison, 2019; Delgado, 2021).

One of the professional careers most affected in the teaching and development of university scientific research is that of education, since its execution characteristics are in the solution of problems related to learning. According to Vila et al, (2014) formative research in university students should promote teamwork, management of information gathering, mastery in work planning and encourage decision making, integrating knowledge and developing various skills.

Education students, like all university students, should develop scientific research, even more considering that with it they will be able to address the problems that arise within their teaching area, this will allow the contribution to improve education with the discovery of new strategies to solve everything that requires attention (Blanco, 2017). The future professional in education, should receive from their study centers the training in research, since this means an important part in their reflection of the inquiry that will allow them to comply with the processes to be future teachers (Fernandez and Johnson, 2015).

Therefore, the development of scientific production developed in higher education institutions contributes to strengthen the quality of research, generate national and international networks and strengthen institutional collaboration among researchers (Hernández, et al, 2021). Considering the importance of research development in education students, it is essential to know about the attitude they present since it will influence the predisposition towards participation in the development of

research generated by the educational institution and also the initiative presented by the students. Therefore, the objective of this study is to describe the attitude index towards scientific research in Peruvian education students.

2. Methodology

The present research was basic and field research, aiming to analyze and understand the phenomenon of attitudes towards research and quality in university education, allowing to increase knowledge in this field of study (Escobar & Bilbao, 2020). The study is of cross-sectional and non-experimental design, because it was measured at a single time and the variables s were not manipulated (Hernández et al., 2014).

2.1 Sample

The research was non-probabilistic by convenience, since the students participated voluntarily in the resolution of a digitized questionnaire, in Google Forms, with 494 undergraduate students of the professional career of Education from six Peruvian universities.

In relation to the study sample, 82.8% were women and 17.2% were men, the ages were between 18 and 51 years, where 17.2% of the sample were between 18 and 19 years old, 49% between 20 and 22 years old and 33.8% between 22 years old and older. The great majority of the participants were in their second to fifth year of study (89.1%). A total of 73.3% were from public universities and 26.7% from private universities. Regarding the financing of their studies, 56.9% were financed by their parents or relatives, while 26.9% came from their own funds, 11.5% through scholarships and 4.7% from other sources of financing *(See Table 1)*.

Table 1: Sample data

		f_x	%
Sex	Woman	409	82.8
	Man		17.2
	Total	494	100.0
Age	From 18 to 19 years old		17.2
	20 to 22 years old	242	49.0
	22 to more		33.8
	Total	494	100.0
Years of study	First year		2.4
	Second year		13.2
	Third year		19.0
	Fourth year		21.9
	Fifth year	173	35.0
	Sixth year		2.6
	Seventh year		5.9
	Total	494	100.0
University Type	Publishes	362	73.3
	Private	132	26.7
	Total	494	100.0
Source of Financing	Proprietary Funds		26.9
	Scholarship or Similar		11.5
	Parents or Relatives	281	56.9
	others		4.7
	Total	494	100.0

Where: f_x =Frequency; %=Percentage. Source: Own elaboration.

2.2 *Instruments*

2.2.1 *Research Attitude Questionnaire IAI*

The instrument to measure attitude towards research IAI validated by (Hernández et al, 2021). Which is derived from adaptations of several authors (Blanco & Alvarado, 2005; Rojas Betancur, 2010) (Rojas Betancur & Méndez Villamizar, 2017) and consists of 19 items, each one is valued with a Likert scale whose scales range from never = 1, sometimes = 2, frequent = 3 and very frequent = 4. The IAI is composed of three dimensions: Institutional Influence (IINT), Self-Assessment (IAE) and finally Teaching Influence (PI). Its reliability was measured with Cronbach's Alpha, whose value was 0.928. Likewise, the instrument allows knowing the students' perception of university quality, which consists of 8 items with a Likert scale according to their assessment of quality in their university, ranging from 0 to 10.

2.3 *Procedure*

To carry out the application of the measurement instruments, authorization was requested from the authorities of each university and teachers, due to the phenomenon of the pandemic that restricted physical contact, the questionnaires were digitized using Google forms, and the students were reached via e-mail and by using other means of communication in the digitized questionnaire, and the informed consent form was added for ethical reasons of research.

The data from the measurement instruments were processed and analyzed using Microsoft Windows V. 2016 Excel program and SPSS Version 25, which allowed descriptive statistics, as well as inferential statistics such as the Student's t-test and internal reliability index using Pearson.

3. Results

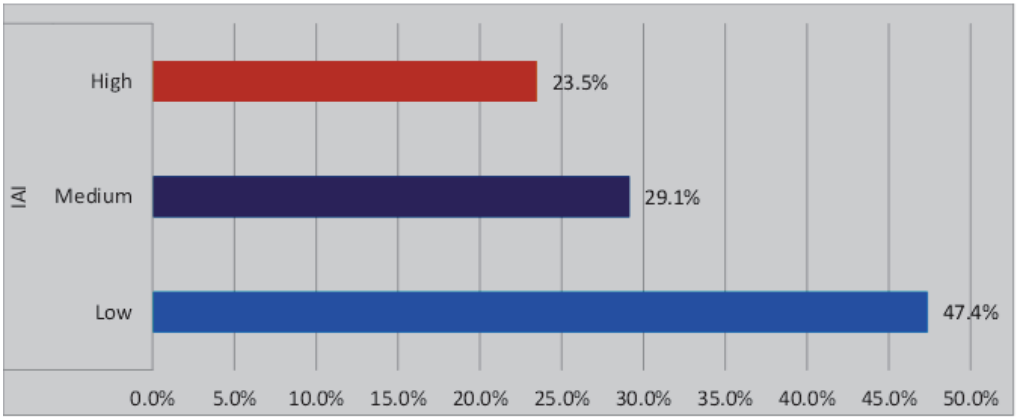


Figure 1: Levels of attitude towards IAI research.

In Figure 1, the index of attitude towards research IAI in the sample studied showed that 47.4% of the students of the professional career of education of six universities in Peru have a low level of attitude towards research, while the medium level has 29.1% and finally the high level of attitude towards research with almost ¼ of the sample with 23.5%.

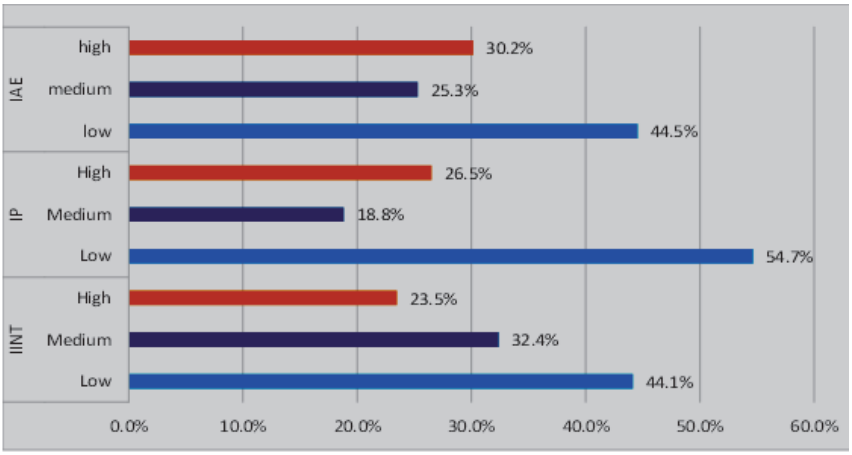
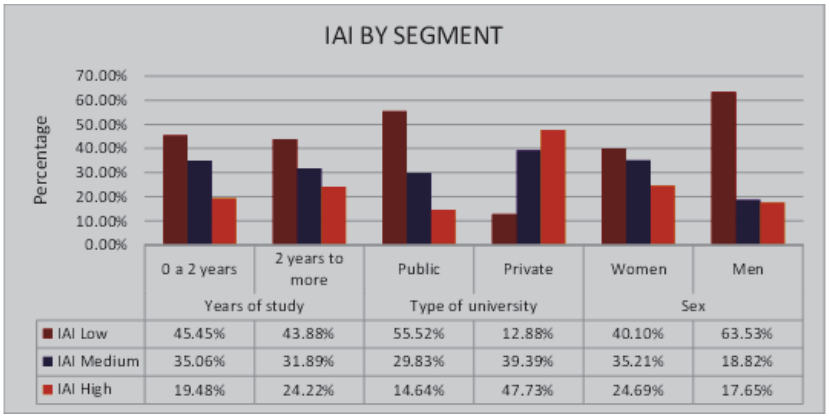


Figure 2: Indicators of attitude towards research by segment

The dimensions of the attitude towards research shown in Figure 2 show that in reference to the dimension of self-evaluation (IAE), 30.2% of the students show a high self-evaluation, 25.3% a medium self-evaluation and 44.5% a low self-evaluation. We also observed the teaching influence dimension (PI), 26.5% of the students showed a high teaching influence, 18.8% of the students showed a medium teaching influence and a higher proportion (54.7% of the students) showed a low teaching influence. Finally, the institutional influence dimension (IINT) 23.5% obtained a high institutional influence, 32.4% and 44.1% of the students showed a medium and low institutional influence respectively.



	0 a 2 years	2 years to more	Public	Private	Women	Men
	Years of study		Type of university		Sex	
IAI Low	45.45%	43.88%	55.52%	12.88%	40.10%	63.53%
IAI Medium	35.06%	31.89%	29.83%	39.39%	35.21%	18.82%
IAI High	19.48%	24.22%	14.64%	47.73%	24.69%	17.65%

Figure 3: Attitude towards IAI research by segment

Figure 3 shows the levels of the research attitude index by segments, where it can be seen that in the years of study segment there is a difference of almost 5% in the high level where students who have been in university education for more than two years have high levels of attitude towards research with 24.22% compared to students who have been in university education for less than two years, who have 19.48%. Likewise, in the type of university segment, private universities have high levels of attitude towards research with 47.73% compared to 14.64% of public universities. Finally, in the

gender segment, it can be seen that it is women who have higher percentages in the high level of attitude towards research with 24.69% compared to men who reach 17.65%.

Table 2: Overall quality of university education

	M	DS
My teachers	7,07	2,067
The university where I currently study	7,02	2,007
My curriculum.	6,82	2,162
The program in which I am enrolled	6,80	2,076
My fellow students	6,70	2,116
My university's wellness services	6,45	2,184
The opportunities my university provides for research	6,43	2,227
Scholarships and awards for students	6,41	2,268
The infrastructure of my university	6,31	2,330
Average total rating	6,67	1,93888

Where: M=Mean; SD=Standard deviation. Source: Own elaboration.

In Table 2, the quality assessment of university education has been evaluated with 8 items, whose best rated items were the university and the curriculum with a mean of 7.07 and 7.02 respectively, and the 2 lowest rated items were scholarships - recognition and infrastructure with 6.41 and 6.31 respectively.

Table 3: Scientific research environment

Item	scale	f	%
do you know the research system of your university?	Don't know/doesn't know	99	20,0
	Low grade		25,1
	In half grade	230	46,6
	To a high degree		8,3
	Total	494	100,0
Do you consider that students at your university are trained in scientific research?	Don't know/doesn't know		7,7
	Low grade	110	22,3
	In half grade	246	49,8
	To a high degree		20,2
	Total	494	100,0
Do you consider that your university promotes the development of scientific production?	Don't know/doesn't know		6,1
	Low grade		17,2
	In half grade	214	43,3
	To a high degree		33,4
	Total	494	100,0
Are you familiar with the research projects at your university?	Don't know/doesn't know	99	20,0
	Low grade		28,5
	In half grade	186	37,7
	To a high degree		13,8
	Total	494	100,0
Do you consider that the quality of scientific training in your academic program is adequate?	Don't know/doesn't know		6,5
	Low grade		19,0
	In half grade	239	48,4
	To a high degree		26,1
	Total	494	100,0

Where: f_x =Frequency; %=Percentage. Source: Own elaboration.

The research environment promoted in the study universities, according to Table 3, shows that 20% of the students do not know about research systems, 7.7% do not know if they are trained in research, 6.1% do not know if the university promotes the development of scientific production, 20% do not

know about scientific research seedbeds and 6.5% do not know if scientific training in their academic program is adequate.

4. Discussion

The present research work reports that the majority population has low levels of attitude towards research; likewise, it strongly shows the problem of the influence of the teacher advisor of the research work and the research policy that the universities promote on the attitude towards research. One of the outstanding results was that 76.5% are in the low and medium levels of attitude towards research. This result coincides with the study conducted with students of higher pedagogical education in Madre de Dios-Peru, which reported that 84.8% of students have a low and unfavorable level of attitude towards research (Estrada et al., 2021); while, in university students in Lima, Peru the majority 77.7% showed a bad and regular attitude towards research (Arellano et al., 2019). In Mexico, 69.8% of university students showed poor and fair attitudes towards research (Barrios & Ulises, 2020). The findings suggest that universities are not evaluating the attitude towards research as a follow-up element to the promotion of research. Probably because of this, there are scarce implementations of workshops related to research (Saavedra & Luna, 2018). This suggests that intervention aimed at improving students' attitude toward research should be taken into account in the implementation of educational strategies. Therefore, the attitude towards research should be addressed from the beginning of academic training, since positive or negative attitudes towards research will depend on personal factors such as emotions and external factors such as teaching-learning conditions to perform research satisfactorily (Palacios, 2021).

Meanwhile, 69.8% in the self-evaluation dimension, 73.5% in the teaching influence dimension and 76.5% in the institutional influence dimension showed levels between medium and low. Other studies also showed similar results in the self-evaluation dimension, as 70.3% presented unfavorable and unfavorable attitude towards research (Estrada et al., 2021), while in teaching influence dimension they refer that teachers have positive attitude and opinions in all variables and all this can be used for further challenges (Taruc, 2016). Since, the attitude towards research on the part of teachers is of great importance since this can either motivate or demotivate university students.

However, regarding the institutional influence dimension, it is evident in the present research that most of them have levels between medium and low, which is similar to the study of (Estrada et al., 2021) where 83.3% have unfavorable and unfavorable levels. While a study conducted in Peru emphasizes that research should be an institutional philosophy, where it should be present from the beginning of the profession, where the subjects highlight the importance of the development of research skills with the purpose of training talents that perform scientific research (De La Cruz & Rodríguez, 2020).

It was also found that private universities have high levels of attitude towards research with 47.73% compared to 14.64% of public universities. In the study of (Rojas et al., 2021) they found that the levels of attitude towards research in a public university in Mexico were from fair to unfavorable. That, partially agrees with the findings of (Perez, 2018) where he mentions that the attitude of students towards research is low and this could possibly be due to the fact that the contents of the academic units have not been promoted. In this regard, (Paredes & Moreta, 2020) mentions that the negative attitude on the part of public university students could be due to the lack of interest and stimulation that influences when starting a research with the objective of developing it and reaching its culmination.

While, the attitude towards research of students in private universities according to the study conducted by (Olivera, 2020), reports that students mostly 65% have unfavorable attitude levels towards research. These findings may also explain the fact that the highest scientific productions are made in private universities; apparently, research policies are better attended and promoted in this type of universities.

Also, females have higher percentages in the high level of attitude towards research with 24.69%

compared to males 17.65%. The said study found differs to the study of (Maqsood et al., 2019), where it reported that male students had positive attitude towards research, while female students did not. Likewise, another study found that there is no significant difference between the two sexes on attitude towards research (Arellanonto et al., 2017). Although the percentage of female students is higher than male students, there is no marked difference in prevalence. So this difference could be pending verification. Likewise, that higher prevalence of positive attitude towards research may be due to the fact that in recent years, the involvement of women in scientific research has been promoted (Consejo Nacional de Ciencia, Tecnología e Innovación Tecnológica [CONCYTEC], 2021).

Likewise, regarding the research environment promoted in universities, 20% do not know about research systems and scientific research seedbeds. However, previous studies reported that less than half do not know about research systems; although they know about their existence, they consider that they are very isolated (Ortega et al., 2018). Possibly, that is the first problem to be addressed, since it seems that research centers could be working a little isolated from the university student population and this includes a non-favorable attitude towards research.

It is important to state some limitations of the study, such as the type of sampling used for the present investigation, since the results could not be generalizable due to its non-probabilistic nature. However, we have tried to achieve a large sample size, so that the results maintain their scientific value; above all, due to the excellent psychometric properties of the instrument used.

5. Conclusion

It is concluded that the majority of university students are in the low and medium levels of attitude towards research and in its dimensions of self-evaluation, teaching influence and institutional influence. It was also found that private universities present high levels of attitude towards research compared to public universities, and with respect to the research environment promoted in universities, 2 out of 10 do not know about research systems and scientific research seedbeds.

In view of this, university authorities could promote greater visibility of the instances that develop research among the student population. Likewise, teachers who teach research courses should have the pertinence of knowledge and experience to motivate a favorable attitude towards research.

References

Arellano, C., Hermoza, R. V., Elías, M. & Ramírez, M. (2019). Attitude towards research in the faculty of health sciences at the Universidad Privada Norbert Wiener, 2017. Universidad Privada Norbert Wiener - WIENER. https://doi.org/10.37768/unw.rinv.07.01.005

Arellanonto, C., Hermoza, R., Elías, M. & Ramírez, M. (2017). Attitude towards research of university students in Lima, Peru. *FEM: Journal of the Medical Education Foundation, 20*(4), 191-197. https://doi.org/10.33588/fem.204.901

Barrios, E. & Ulises, D. (2020). Design and validation of the questionnaire Attitude towards research in university students. *Innova Educación Magazine, 2*(2), 280-302. https://doi.org/10.35622/j.rie.2020.02.004

Blanco, N. & Alvarado, M. (2005). Scale of Attitude Toward the Social Scientific Research Process. *Revista de Ciencias Sociales*, 11, 537-546. https://doi.org/10.31876/rcs.v11i3.25304.

Blanco, M. (2017). Learning styles and attitudes towards scientific research in university students. *Research & Development, 25*(2), 82-99. doi: http://dx.DOI.org/10.14482/indes. 25.2.10960

Casadevall, A. & Fang, F. (2016). Rigorous Science: A How-To Guide. mBio,07 (06), e01902-16. https://doi.org/10.1128/mbio.01902-16

Casalino, C, (2017). Three stages and two illustrious personalities in the history of the Universidad Nacional Mayor de San Marcos. *Investigaciones sociales, 21*(38), 173-186.

Cervantes Liñán, L. , Bermúdez Díaz, L. & Pulido Capurro, Víctor (2019). Situation of research and its development in Peru: reflection of the current state of the Peruvian university. *Pensamiento & Gestión*, (46), 311-322. https://doi.org/10.14482/pege.46.7615

National Council for Science, Technology and Technological Innovation (2017). I National Census of Research and Development to Research Centers. Retrieved from http://portal.concytec.gob.pe/index.php/publicaciones/censo-nacional-id.

National Council for Science, Technology and Technological Innovation (2021). Official launch of the alliance + Women and Girls in Science. Available at: https://mujercti. concytec.gob.pe/noticia/launch-official-of-the-women-and-girls-in-science-alliance/

Corona, J. (2016). Scientific research. A way of reflection. *MediSur, 14*(3), 243-244. http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1727-897X2016000300002&lng=es&tlng=es.

De La Cruz, J. A. & Rodríguez, E. (2020). Research: Beyond university rankings. *Journal of the Faculty of Human Medicine, 19*(1). https://inicib.urp.edu.pe/rfmh/vol19/iss1/2

Delgado, J. (2021). Scientific research: its importance in the training of researchers. *Ciencia Latina Revista Científica Multidisciplinar,* 5(3), 2385-2386. https://doi.org/10.37811/cl_rcm.v5i3.476

Estrada, E., Amesquita, F., Ramos, N. & Uchasara, H. (2021). Attitude towards scientific research in Peruvian students of pedagogical higher education. *Apuntes Universitarios, 11,* 60-72. https://doi.org/10.17162/au.v11i3.691

Escobar, P. & Bilbao, J. (2020). *Research and Higher Education.* Editorial Lulu.

Fernandez, M. & Johnson, D. (2015). Action research in teacher education: Historical development, epistemological assumptions, and methodological diversity. *Psychoperspectives*, 14(3), 93-105. https://dx.doi.org/10.5027/psicoperspectivas-Vol14-Issue3-fulltext-626

Gálvez, N., Gonzáles, Y. & Monsalve, M. (2019). Attitude towards scientific research at the end of the nursing career in Peru. *Gaceta Médica Boliviana, 42*(1), 32-37.

Gotuzzo, E. , González, E. & Verdonck, K. (2010). Researcher training in the context of collaborative projects: experiences at the Institute of Tropical Medicine "Alexander von Humboldt", Universidad Peruana Cayetano Heredia. *Revista Peruana de Medicina Experimental y Salud Publica, 27*(3), 419-427. http://www.scielo.org.pe/scielo.php?script=sci_arttext&pid=S1726-46342010000300015&lng=es&tlng=es

Hernández, I. (2009). The teacher-researcher in the formation of professionals. Revista *Virtual Universidad Católica del Norte*, 27, 1-21.

Hernández, R., Fernández C. & Baptista, P. (2014). *Research Methodology (*6th ed.). Mc Graw-Hill Interamericana.

Hernández, R. M., Saavedra-López. M. A. , Calle-Ramirez, X. M. & Rodriguez-Fuentes A. (2021) index of undergraduate students' attitude towards scientific research: a study in Peru and Spain. Jurnal Pendidikan IPA Indonesia. 10 (3) 416-427. https://dx.doi.org/10.15294/jpii.v10i3.30480

Hernández, R., Saavedra-López, M., Wong-Fajardo, E., Campos-Ugaz, O., Calle-Ramírez, X. & García-Pérez, M. (2021). Iberoamerican scientific production on ICT in the educational context. *Propósitos y Representaciones, 9*(3), e1443. http://dx.doi.org/10.20511/pyr2021.v9n3.1443.

Information Technology, (2011). Research in Latin America. Información Tecnológica, 22(3), 1. https://dx.doi.org/10.4067/S0718-07642011000300001

Loli, R., Sandoval, M., Ramírez, E., Quiroz, M., Navarro, R. & Rivas, L. (2015) Teaching learning research: social representation from the student perspective. Anales de la Fcaultad de Medicina, 76(1), 47-56. http://www.scielo.org.pe/scielo.php?script=sci_arttext&pid=S1025-55832015000200008&lng=e

Maqsood, Z., Jabeen, S., Chaudhry, N. & Sardar, I. (2019). Attitude towards research of university students, A Multivariate analysis. *Pyrex Journal of Educational Research and Review, 4*(3), 37-43.

Medina, D. (2018). The role of Peruvian universities vis-à-vis research and technological development. *Propósitos y Representaciones, 6*(2), 703-720. http://dx.doi.org/10.20511/pyr2018.v6n2.244.

Moreno-Crespo, P., Corchuelo-Fernández, C., Aránzazu, C. & Moreno-Fernández, O. (2021) Teacher training and employment in Spanish scientific research from 1977 to 2019). *Culture and Education, 33*(2), 259-291. https://doi.org/10.1080/11356405.2021.1904655

Olivera, E. (2020). Attitudes towards research of bachelor's degree holders in management and psychology at a Peruvian university. *Revista Chakiñan de Ciencias Sociales y Humanidades, 11,* 70-81. https://doi.org/10.37135/chk.002.11.05. https://doi.org/10.37135/chk.002.11.05

Orteaga, R. J. O., Veloso, R. & Hansen, O. (2018). Perception and attitudes towards scientific research. *Academo,* 5(2), 101-109.

Palacios, L. (2021). A systematic review: Attitude towards research in Latin American universities. *Comuni@cción, 12*(3), 195-205. https://doi.org/10.33595/2226-1478.12.3.533

Paredes, F. & Moreta, R. (2020). Attitudes towards research and self-regulation of learning in university students. *CienciAmérica: Revista de Divulgación Científica de la Universidad Tecnológica Indoamérica, 9*(3). http://portal.amelica.org/ameli/jatsRepo/367/3671816005/html/index.html

Perez, M. (2018). Research attitude index and willingness to degree by thesis. *Perspectivas Metodológicas, 18*(21), Article 21. https://doi.org/10.18294/pm.2018.1900

Reichlin, T. S., Vogt, L. & Rbel, H. (2016) The researchers' view of scientific rigor-Survey on the conduct and reporting of in vivo research. *PLOS One, 11*(12). https://doi.org/10.1371/journal.pone.0165999.

Rodriguez, AJ, & Morrison, D. (2019) Expanding and enacting transformative meanings of equity, diversity, and social justice in science education. *Cultural Studies of Science Education. 14*, 265-281 (2019). https://doi.org/10.1007/s11422-019-09938-7

Rojas Arenas, I. Durango Marín, J. & Rentería Vera, J. (2020). Formative research as a pedagogical strategy: a case study of industrial engineering at IU Pascual Bravo. *Estudios pedagógicos,* 46 (1), 319-338. https://dx.doi.org/10.4067/S0718-07052020000100319

Rojas Betancur, M. (2010). Student attitudes about research at the university. *Investigación y Desarrollo*, *18*, 370-389.

Rojas Betancur, M. & Méndez Villamizar, R. (2017). Research training processes at the university: what is left for students? *Sophia*, *13*, 53-69.

Rojas, J., Espinosa, D., Espíndola, M. & Hernández, S. (2021). Attitude towards research in Mexican university students: An exploratory analysis. *Contemporary dilemmas: education, politics and values, 8*(SPE4). https://doi.org/10.46377/dilemas.v8i.2747

Rubio, M., Vila, R. & Berlanga, V. (2015). Formative research as a learning methodology in the improvement of transversal competencies. *Ciencias Sociales y del Comportamiento*, (196), 177 - 182. https://doi.org/10.1016/j.sbspro.2015.07.037

Saavedra, P. C. & Luna, A. (2018). Factors associated with attitude towards research in undergraduate nursing students. CASUS: Journal of Research and Cases in Health, 3(2), 83-88.

Taruc, P. W. (2016). Influence of Teachers' Beliefs and Attitude towards Action Research. *Liceo Journal of Higher Education Research, 12*(2). https://doi.org/10.7828/ljher.v12i1.959

Tolbert, S., Schindel, A. & Rodriguez, AJ (2018). Relevance and relational responsibility in justice-oriented science education research. *Science Education*, *102* (4), 796-819. https://doi.org/10.1002/sce.21446

Turpo-Gebera, O., Limaymanta, C. H. & Sanz-Casado, E. (2021). Scientific and technological production of Peru in the South American context: a scientometric analysis. *Profesional De La Información*, 30(5). https://doi.org/10.3145/epi.2021.sep.15. https://doi.org/10.3145/epi.2021.sep.15.

Veloso, R., Hansen, S. & Ortega, R. (2019). Perception and attitudes towards scientific research. *Revista Científica Estudios e Investigaciones*, 8,47-48. http://dx.doi.org/10.30545/academo

Vila Baños, R., Rubio Hurtado, M. & Berlanga Silvente, V. (2014). Formative research through project-oriented learning: an innovation proposal in the Pedagogy Degree. *Innovación Educativa*, (24). https://doi.org/10.15304/ie.24.1586