



Critical thinking in higher education students: a systematic review

Pensamiento crítico en estudiantes de educación superior: una revisión sistemática

Pensamento crítico em alunos do ensino superior: uma revisão sistemática


Carolina Lopez-Ruiz¹

Universidad César Vallejo, Trujillo – Trujillo, Perú

 <https://orcid.org/0000-0002-9472-7651>
cadelpizz@gmail.com (correspondence)


Roxana Flores-Flores

Universidad César Vallejo, Trujillo – Trujillo, Perú

 <https://orcid.org/0000-0003-4346-123X>
rflores@ucvvirtual.edu.pe


Ana Galindo-Quispe

Universidad César Vallejo, Trujillo – Trujillo, Perú

 <https://orcid.org/0000-0001-7945-887>
aquispe@ucvvirtual.edu.pe

Yolanda Huayta-Franco

Universidad César Vallejo, Trujillo – Trujillo, Perú

 <https://orcid.org/0000-0003-0194-8891>
yhuayta@ucvvirtual.edu.pe

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KEYWORDS

Critical thinking, cross-cutting skills, higher education, problem

ABSTRACT. The present study aims to analyze the academic contributions to the development of critical thinking in higher education students. The methodology used was a systematic review with descriptive level, using the PRISMA Statement method, using the search in the online databases of Scopus, EBSCO, ProQuest, and ERIC. The review considered the profile of the university teacher, didactic strategies and skills for the development of critical thinking, and the appropriate context for its strengthening. Thirteen scientific articles were analyzed, of which 5 articles were of descriptive non-experimental design, 5 were quasi-experimental and 3 were of mixed design. It was concluded that the development of critical thinking is necessary in higher education since it is considered an indispensable skill to face the challenges in a globalized world and also allows the teacher and the

¹ Master in Education with mention in Teaching and Educational Management from Universidad Cesar Vallejo, Peru.

solving, systematic review.

student to develop within a teaching-learning process that demands clarity, efficacy, precision, and equity in problem-solving.

PALABRAS CLAVE

Pensamiento crítico, competencias transversales, enseñanza superior, resolución de problemas, revisión sistemática.

RESUMEN. El presente estudio tiene como objetivo analizar los aportes académicos para el desarrollo del pensamiento crítico en estudiantes de educación superior. La metodología que se usó fue una revisión sistemática con nivel descriptivo, utilizando el método de Declaración PRISMA, empleando la búsqueda en las bases de datos online de Scopus, EBSCO, ProQuest y ERIC. En la revisión se tuvo en cuenta el perfil del docente universitario, estrategias didácticas, habilidades para el desarrollo del pensamiento crítico y el contexto adecuado para su fortalecimiento. Se realizó el análisis de 13 artículos científicos, de los cuales 5 artículos fueron de diseño no experimental descriptivo, 5 cuasi-experimentales y 3 de diseño mixto. Se concluyó que el desarrollo del pensamiento crítico es necesario en la educación superior, pues es considerada como una habilidad indispensable para enfrentar los retos en un mundo globalizado y también permite al docente y al estudiante, desenvolverse dentro de un proceso de enseñanza-aprendizaje que exige claridad, eficacia, precisión y equidad en la resolución de problemas.

PALAVRAS-CHAVE

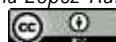
Pensamento crítico, habilidades transversais, ensino superior, resolução de problemas, revisão sistemática

RESUMO. O presente estudo tem como objetivo analisar as contribuições acadêmicas para o desenvolvimento do pensamento crítico em estudantes do ensino superior. A metodologia utilizada foi uma revisão sistemática com nível descriptivo, utilizando o método da Declaração PRISMA, utilizando a pesquisa nas bases de dados online da Scopus, EBSCO, ProQuest e ERIC. A revisão levou em consideração o perfil do professor universitário, as estratégias de ensino, as habilidades para o desenvolvimento do pensamento crítico e o contexto adequado para o seu fortalecimento. Foi realizada a análise de 13 artigos científicos, sendo 5 artigos de delineamento descriptivo não experimental, 5 quase experimental e 3 de delineamento misto. Concluiu-se que o desenvolvimento do pensamento crítico é necessário no ensino superior, visto que é considerada uma habilidade imprescindível para enfrentar os desafios de um mundo globalizado e também permite que o professor e o aluno funcionem dentro de um processo de ensino-aprendizagem que exige clareza, eficiência, precisão e justiça na resolução de problemas.

1. INTRODUCTION

For decades, educational policies have been based on rote teaching at all educational levels (Lara, 2019), being the simplest and most rudimentary action, which has been used through many years hidden under traditional learning, which consists simply accumulate information the same that can show results in cases represented by a minority, But today teaching has evolved through pedagogical practice, turning from rote learning to meaningful learning, which is an educational challenge of the 21st century, as a consequence of the age of knowledge, the implantation of a new meaning to the teaching that encourages critical thinking as a way to ensure that students can express opinions, adapt to reality, promote innovation and problem solving, thus achieving their highest academic level (Franco et al., 2014).

In higher education, it is intended that educational training is connected to reality, so that it has a concrete and useful meaning in the life of the student (Matienzo, 2020). In higher education, it is intended that educational, thus contextualizing the theoretical contents, promoting the development of critical thinking in solving problems in their daily and social life, for students to develop skills, abilities, and their future job placement (Vendrelli & Rodríguez, 2020).

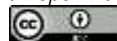


The competencies acquired by people such as arguing, analyzing, solving, and evaluating are the key to personal progress (Flores, 2016), in this sense, countries are concerned to promote these competencies for the benefit of solving specific problems after considering widely other options, in a globalized society avoiding the pressures that lead to normalization or standardization, with the advancement of science and technology will allow us to choose the best decisions. The nations in which development-oriented policies are established facilitate good job performance and innovation, achieving its progress (OECD, 2019). It is important that developing countries understand and use these policies in the field of education and mainly in higher education adopting different types of competences (UN, 1998).

It is a purpose of the Ministry of Education of Peru, to guarantee a quality education, through norms that promote the achievement of a professional profile of global competitiveness, with policies in accordance with the 2030 Agenda for Sustainable Development, approved by the United Nations Organization in 2015 (MINEDU, 2018). Here the commitment to an inclusive and equitable quality education is sought, which favors continuous learning for all. Higher education, being the second stage of the educational system, seeks to develop in students' skills that turn them into professionals according to the demands of the local, regional, national, and international market, that are competitive with comprehensive training, providing them with educational and relevant quality (MINEDU, 2018). In correspondence with development policies to improve the standard of living of the population at a professional and personal level.

In surveys carried out to companies to find out what skills are required by employers, it was evidenced that they consider, for the most part, those that correspond to the following criteria: learning to learn, communication, teamwork and problem solving (OIT, 2017). Learning to learn comprises the knowledge, skills, attitudes, and aptitudes that for the achievement of their learning is autonomous. Communication as the ability to discern what other people are saying and to make ideas understood clearly and effectively. Teamwork is like being efficient in a team by either leading or cooperating. Problem solving involves the analytical skills necessary to assess situations and make decisions about how to best solve problems (OIT, 2017). Within these general competencies enunciated by ILO officials, we can consider critical thinking as the way to question, analyze, resolve and innovate, creating new alternative solutions for a better result.

Critical thinking are the processes, strategies, and mental representations that the individual uses for problem solutions, decision making, and learning new concepts (Sternberg, 1986), belongs to a group of skills that are characterized by having mastery of the content and its learning and application (Paul & Elder, 2005) prioritizing reason and evidence. Critical thinking is important in education, which is where learning is taught with an open mind, inquiring and examining knowledge, with freedom of thought, principles and respect for our dignity (Lipman, 1992), differentiating the opinions of others, with mental empathy, integrity and intellectual perseverance. Critical judgment is reflective, it reviews the situations that are presented to it; is reasonable, organizes and analyzes the information; concludes according to criteria and evidence, being also evaluative making a judgment of the values of situations that arise (De-Juanas, 2013). Critical thinking is present in problem solving, in decision-making, acting, using reason, enabling the individual to have an open mind, allowing to understand the perspectives of other people (Saadé et al., 2012).



In the DELPHI project in the United States, experts in critical thinking from that country came together to define and characterize it (Facione, 1990 cited in Ossa et al., 2017), Critical thinking is understood as a superior thinking of the individual who, based on his academic training, seeks to enrich him as a personal and professional objective, strengthening the skills and capacities of interpretation, analysis, assessment, and deduction. In the same vein, the consolidation of critical thinking through the listed capacity enables the interpretation of circumstances or realities, based on conceptual, methodological, criteriological or contextual evidence, in which the solution is based on the problem (Facione, 2007 cited in Ossa et al., 2017). Showing this way, the intellectual abilities such as: "Open mind; Analysis, Cognitive maturity, Search for the truth, Systematicity; Curiosity; and, Self-confidence" (Ossa et al., 2018, p. 20). Critical thinking is active, it has cognitive ability. The reasons for believing in something are fundamental, it must reach some goal, this makes the action have a conscious objective, making the work systematic (Guichot, 2013). Thought has evolved to serve the interests of survival and well-being.

In agreement with the specialists of the American Psychological Association (APA), they established the six dimensions of critical thinking are: interpretation, analysis, evaluation, inference, explanation, and self-regulation. In this sense, thinking skills are perfected with the qualities that an individual must become a critical thinker (Facione, 2007). Five skills that the critical thinker must have are considered, which are: (a) ask questions based on the problems encountered, (b) obtain, search, select and evaluate information (c) make reasonable conclusions, (d) think without prejudice, being receptive to other ideas and evaluating them to recognize them and assessing their consequences, and (e) effectively communicate alternative solutions to complex problems (Paul & Elder, 2005). In critical thinking, three main aspects can be considered: (a) a result that is explained as the determination about the belief, (b) a reasoning for decision and (c) the logical relationship between decision and arguments to understand it, and enumerate a series of provisions on critical thinking, such as: use of information sources, investigation of alternatives, investigation of reasons, consideration of the total situation and order in the difficulty of the parties (De-Juanas, 2013) assumptions about aspects with those who do not agree, sensitivity to the feelings of others and openness to reflect on other points of view, even if they do not coincide with their own.

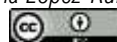
The purpose of this study is to identify and analyze the contributions made for the development of critical thinking in higher education students in social sciences of undergraduate careers of education, law and psychology between the years 2013 to 2020.

2. METHOD AND MATERIALS

The research carried out was a descriptive systematic review on scientific articles, which began from an exploration of scientific literature from 2013 to 2020.

Electronic searches were conducted between, 01 September to 29 December 2020. In different online databases (Scopus, EBSCO, ProQuest, ERIC) using the following descriptors in searches in Spanish and English: "critical thinking", "creative thinking", "higher education", in turn combining the use of the Booleans AND and finally OR.

The exclusion criteria were duplication, not being scientific articles (papers, reviews, publications in newspapers, doctoral or master theses, testimonies, etc.) and because they did not correspond to the subject of interest. For



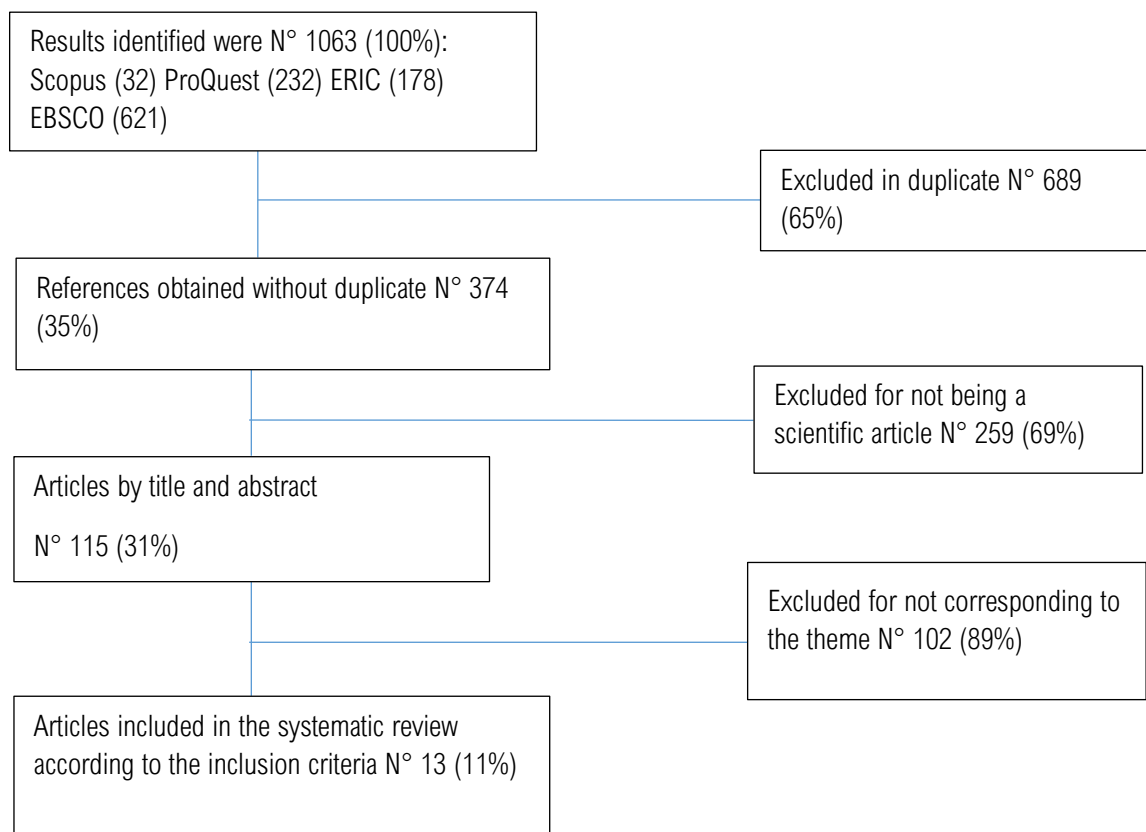
the inclusion criteria, the name of the title, abstract, methodology, as participants, undergraduate higher education students from various countries of the last seven years and results were considered; of the articles retrieved with the search strategies, in addition the articles found were exhaustively reviewed by blind peers.

For the search strategy, the PRISMA Declaration (Preferred Reporting Items for Systematic Reviews and Meta Analyses) was considered as methodology (Urrútia & Bonfill, 2010). All studies that had the potential to respond to the stated objective were collected, they were searched in full text and open access. The flow of the systematic review for the study selection process was carried out, then they were classified in a table, using the Mendeley manager. Finally, 1,063 were found registered in the online databases, of which 689 were excluded due to duplication; leaving 374, then 259 were excluded for not being a scientific article; leaving 115 of this new total, 102 were excluded because they did not correspond to the subject of interest; and then 13 articles remain, the same ones that are analyzed in the present study.

3. RESULTS AND DISCUSSION

The analysis and results show the processing of the data obtained, for the articulation of the systematic analysis.

Figure 1. Flowchart of the systematic review



Source: Adapted from PRISMA.

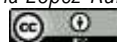
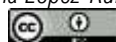
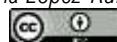


Table 1. Articles analyzed

N°	Author/Year	Country	Type of study	Sampling	Indexing	Contributions
1	(Estigarribia, 2020)	Paraguay	The research was applied observational, descriptive and cross-sectional.	310 university students	Scopus	The study contributes that the cognitive abilities of critical thinking are at an intermediate level of development in the students' vision. This evidenced the arrest of some barriers, and trends; on the one hand, with critical thinking skills, and on the other, with rejection of established models and beliefs. However, awareness and the need for the development of critical thinking are present.
2	(García et al., 2020)	Colombia	Descriptive quantitative cut.	100 students	ERIC	The study contributes that each human being develops their own critical thinking, as a process by which the individual must reflect on different states or experiences of their daily life to solve problems, refer a position and guide satisfactory responses to the parts.
3	(Loaiza et al., 2020)	Colombia	Mixed methodology.	158 students	ERIC	This article contributes that in a classroom, where the center is the student, and his learning is prioritized, he will develop critical thinking with greater skill.
4	(López et al., 2020)	Peru	The research was quantitative, quasi-experimental design, of a basic type.	180 university students	ProQuest	The contribution of the study considered that university didactics is positioned to ensure that teachers achieve that their students develop deep, considerable and outstanding knowledge, which allows them to enter the world of work through the development of critical thinking.
5	(Tabares et al., 2019)	Colombia	Quasi-experimental study with pre and post measurements with a single group.	20 psychology students.	ERIC	The study provides that critical thinking is capable of being developed throughout the student's professional career in each subject, through the critical debate strategy that can be used in university classes.
6	(Silva et al., 2019)	Portugal	Quasi-experimental study, with pre	41 university students	ProQuest	This article contributes that a collaborative learning approach using visual organizers and not



			and post-test, with an experimental group (n = 19) and a control group (n = 22) undergraduate students.			lectures in the classroom, manages and develops critical thinking in students of the university of the faculty of education.
7	(Ossa-Cornejo et al., 2018)	Chile	The study followed a methodology of quantitative cut and cross-sectional scope.	Non-probabilistic sample of 129 students from four teaching majors.	EBSCO	This article contributes that the Critical Thinking Tasks (TPC) instrument is reliable, it is based on the idea that the discipline influences the development of critical thinking. In sum, it is a priority to strengthen specific skills such as inquiry, analysis and communication and to improve this skill.
8	(Sabariego Puig et al., 2019)	Spain	Mixed method with a triangulation design combining complementary techniques.	215 university students.	Scopus	The study contributes on narrative strategies, as a didactic strategy, which favors the development of creative thinking, and provides them with help when it comes to understanding and performing tasks, that is, they are aware of what they learn and how they learn it.
9	(Olivares & Cabrera, 2017)	Mexico	The study design is quantitative, transectional, descriptive, and non-experimental.	135 higher education students.	ProQuest	The article contributes that to ensure student learning it is essential to keep critical thinking in mind, through situations linked to interpretation, judgment of specific situations and inference.
10	(Betancourth et al., 2017)	Chile	Descriptive quantitative approach.	141 university law students.	EBSCO	This study contributes that Chilean university students develop critical thinking through interrelation with the surrounding context, especially in the socio-cultural environments to which they belong.
11	(Steffens et al., 2017)	Colombia	Descriptive - explanatory type and quasi-experimental design, with an emergent descriptive field paradigm.	355 higher education students.	EBSCO	The article contributes that the critical thinking of students shows particularities of a systematic level, in this sense, for the improvement of the development of critical thinking of students, the training of their teachers is essential, therefore, if the teachers manage to develop their thinking critic and transform their didactic



						practices it is possible to train students and creative critics.
12	(Quintero et al., 2017)	Colombia	The type of study was of a mixed, quasi-experimental and transactional nature.	50 students.	EBSCO	The study contributes that Problem-Based Learning is a teaching strategy that promotes generic competencies and capacities for the formation and development of critical thinking. In this sense, critical thinking allows future professionals, within their work context, to make informed decisions for effective and efficient results.
13	(Zambrano et al., 2013)	Colombia	The research was quasi-experimental.	39 psychology students.	ERIC	The article contributed that for the proper development of skills towards critical thinking, the use of the controversial-Socratic didactic technique should be implemented in university classrooms.

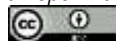
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The development of critical thinking in higher education students is vital to promote and implement significant didactic strategies from Estigarribia (2020), these strategies must be appropriate for each student's career end, including information and communication technologies, communication, understanding these as intermediaries to enhance the development of critical thinking, considering the autonomy and cognitive abilities of each future professional.

To measure the performance level of critical thinking in scientific reasoning, through the Critical Thinking Tasks (TPC) test (Ossa-Cornejo et al., 2018), it is necessary to prioritize the following skills in students, such as inquiry, analysis and finally communication, in this way students can develop critical thinking from the first cycles of their professional career and throughout their training process, so that upon completion, students have the ability to process their own critical thinking.

The significance that teachers are always in constant training will generate the consolidation of critical thinking and the appropriate use of didactic strategies (Steffens et al., 2017). In this sense, that if teachers manage to develop their critical thinking and change their good teaching practices, it is feasible to get "critical-entrepreneurial-creative" students. Consequently, teaching at a higher institute or university requires professors capable of knowing and applying a large repertoire of didactic methodologies (López-novoa et al., 2020) and these will be focused on student learning, considering the nature of the conditions for the act of learning itself to occur, and for the development of critical thinking to be carried out as a transversal competence throughout the university career. In this sense, a didactic strategy used for this purpose is the Socratic controversy (Zambrano et al., 2013) the effects of this methodology if it self-regulates critical thinking in students, generating various skills such as thinking, arguing, and making judicious statements.

Along the same lines, Problem-Based Learning (PBL) is another didactic strategy that significantly promotes critical thinking, through skills and abilities (Quintero et al., 2017). This didactic strategy must be continuously



strengthened and fed back, to ensure that the majority of students convert their predisposition to critical thinking, and in this way achieve desired performances, throughout the development of their professional training, and at the same time, they will allow students to achieve verbal or written skills, taking importance on the development of critical analysis.

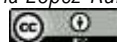
Consequently, the dynamization of the environment of the cognitive and intellectual abilities of university students develop critical thinking through the strategy of critical debate (Tabares et al., 2019), which is another of the many methodologies that are related to increasing critical thinking, in this way students will reflect on current and interesting topics, achieving excellent grades, and also realizing the resources and materials that determine the efficiency of their achievements. Likewise, the strategy of using visual organizers by students through collaborative learning develops critical thinking skills (Silva et al., 2019). The implementation of teaching strategies, whatever it may be, will always improve critical thinking skills and their implications for problem solving.

It should also be noted that another didactic strategy that favors creative thinking are narrative strategies, highlighting the role of the student, in what he experiences and learns significantly in the classroom (Sabariego et al., 2019). In this sense, the student becomes the protagonist of their own learning, since narrative strategies will allow them to understand and promote critical thinking, as an appropriate option to be participatory, reflective, and critical about their learning process. In this way he builds it, based on his previous and significant knowledge, since he cannot detach himself from it, since it is part of his experiences within the society in which he lives.

It can also be said that thinking develops naturally, where individuals determine their levels of analysis, reflection, argumentation, justification (García et al., 2020) and in this way, the development of critical thinking is encouraged, through reflection on different characteristics of daily life, the chronological age of the students playing an important role, within a range of 20 to 25 years of age. During these ages, individuals can establish and develop logical and abstract thoughts and from there to stimulate critical thinking, through sequences of didactic strategies in enriched contexts.

Similarly, higher education students, through three critical thinking situations, such as the situation associated with the interpretation of information, the situation associated with the judgment of specific situations and the last situation associated with the inference of consequences, is the only way to ensure the success of their learning (Olivares & Cabrera, 2017). For this reason, it can be stated that students rely on common sense to record the most relevant knowledge, always considering the analysis of the information, based on the evidence. Likewise, students must also bear in mind the interrelation with the socio-cultural environment that surrounds those (Betancourth et al., 2017) to effectively develop critical thinking, in this sense, higher education institutions have a social commitment to provide them with relevant and innovative programs and methodologies.

Critical thinking and creativity are closely related, in terms of the reading that students must develop in their three levels, understand, interpret and then reflect (Eder et al., 2020) so that students can reach the last level, that is the teacher's priority is also to be creative and at the same time encourage critical thinking, with current and interesting topics, and what is taught must be meaningful for the student, and allow him to adapt to the new context in a creative and critical way.



4. CONCLUSIONS

It is concluded that teaching must be centered on the student, supporting their autonomous learning, which requires the teacher to use various didactic strategies and motivate the development of critical thinking, which is the ability to identify, analyze, evaluate, classify, and interpret what is found in our environment. Likewise, knowing that one of the most interesting challenges for teachers, in this new era of science and technology, is to teach students to think, on their own, without considering the curricular experience or the profession chosen by them, the responsibility is that the student manages enough tools to solve problem situations by themselves, encouraging critical thinking in them.

In this sense, the development of critical thinking is necessary in higher education, both for students and educators, as it is considered an indispensable skill to face the challenges, challenges and achieve goals in a globalized and technological world. In addition, it also allows the teacher and the student to function within a teaching-learning process that requires clarity, efficiency, precision, and equity in problem solving.

It is recommended to give continuity to other studies, which allow a clear control of the investigated matter with innovative programs and the use of activities that promote the development of critical thinking, considering the style and rhythm of student learning, while directing, critical thinking skills for the improvement of educational quality.

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Carolina López: conceptualización, curación de datos, análisis formal, adquisición de fondos, investigación, metodología, administración del proyecto, recursos, software, supervisión, validación, visualización, escritura - preparación del borrador original, escritura - revisar & edición.

Roxana Flores: conceptualización, análisis formal, investigación, metodología, administración del proyecto, recursos, software, supervisión, validación, visualización, escritura - preparación del borrador original, escritura - revisar & edición.

Ana Galindo: conceptualización, investigación, metodología, administración del proyecto, recursos, software, supervisión, validación, visualización, escritura - preparación del borrador original, escritura - revisar & edición.

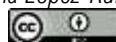
Yolanda Huayta: conceptualización, investigación, metodología, administración del proyecto, recursos, software, supervisión, validación, visualización, escritura - preparación del borrador original, escritura - revisar & edición.

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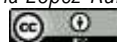
Aspectos éticos / legales; Ethics / legals:

Los autores declaran no haber incurrido en aspectos antiéticos, ni haber omitido aspectos legales en la realización de la investigación.



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