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Cyber competencies and research skills: Key drivers of educational transformation among university students in the San Martín region, Peru

Competencias cibernéticas y habilidades investigativas: claves para la transformación educativa en universitarios de la región San Martín, Perú

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ABSTRACT

Objective. To determine the relationship between cyber competencies and research skills among humanities students at the Universidad Nacional de San Martín, 2024. **Methods.** A basic, descriptive-correlational, quantitative study with a non-experimental design was conducted with a population of 100 students and a sample of 55 from the Schools of the Faculty of Education and Humanities at the Universidad Nacional de San Martín in Peru. The survey technique was applied using two questionnaires: one on cyber competencies and another on research skills for university students. **Results.** A significant correlation was found between the variables "cyber competencies" and "research skills" among university students (rho = 0.589; p = 0.001). The dimensions "cybersecurity strategy," "cyber social culture," and "education" were the most highly rated, with 72.7% at a medium level. Regarding research skills, the dimensions "exploratory," "technological," and "written communication" were also at a medium level (63.6%). **Conclusions.** A positive relationship was identified between cyber competencies and research skills in humanities students.

Keywords: *cyber competencies; research skills; digital competencies; scientific research; cyberculture.*

RESUMEN

Objetivo. Determinar la relación entre las competencias cibernéticas y las habilidades investigativas en estudiantes de humanidades de la Universidad Nacional de San Martín, 2024. **Métodos.** Se empleó una tipología básica, de nivel descriptivo correlacional, de enfoque cuantitativo y diseño no experimental, donde fueron consideradas una población de 100 estudiantes y una muestra de 55, pertenecientes a las escuelas de la Facultad de Educación y Humanidades de la Universidad Nacional de San Martín (Perú), a quienes se le aplico la técnica de la encuesta a través de dos cuestionarios: uno de "competencias cibernéticas y otro de habilidades investigativas para universitarios. **Resultados.** Se encontró una correlación significativa entre las variables "competencias cibernéticas" y "habilidades investigativas" en los estudiantes universitarios (rho = 0,589; p = 0,001). Las dimensiones, "estrategia de ciberseguridad", "cultura cibernética social" y "educación" fueron las más valoradas, con un 72,7 % en un nivel medio; en cuanto a las habilidades investigativas en las dimensiones "exploratoria", "tecnológica" y "comunicativa a nivel escrito", estas se encontraban en un nivel medio, con un 63,6 %. **Conclusiones.** Se determinó una relación positiva de las competencias cibernéticas y habilidades investigativas en estudiantes de humanidades.

Palabras clave: *competencias cibernéticas; habilidades investigativas; competencias digitales; investigación científica; cultura cibernética.*

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INTRODUCCTION

In recent years, technological advancement has become established as an essential element of social life, giving rise to what various authors refer to as the digital era. This context enables individuals to interact continuously with technological platforms and devices integrated into their daily activities. Likewise, the development of digital competencies involves putting into practice an articulated set of abilities, knowledge, and skills that users must apply when engaging with technological media. From this perspective, possessing digital proficiency is essential for functioning adequately in tasks that require technical capabilities, especially in the conduct of scientific research.

At the international level, in Spain, Sánchez et al. (2022) argue that they observed different behaviors among the experimental subjects, since students of Spanish origin showed a higher level of cyber competencies compared with Latin American students, in this case, Argentinians. Regarding the same issue, Ciraso-Calí et al. (2022) mention that communicative skills and scientific review skills are the least present in research courses, and that the least developed abilities are literature review and knowledge of metascientific content.

Segrera-Arellana et al. (2020), in their research conducted in Colombia, found that most students were at an advanced level in cyber competencies, although the majority did not actually reach that level. Moraga et al. (2024), for their part, maintain that in personnel selection and human resource management, artificial intelligence is important because of its interaction with labor relations. Rojas-Hernández et al. (2021) argue that there are obstacles associated with mastery of research skills for the design and execution of scientific research. In the studies by Vera-Rivero et al. (2021), the researchers state that students experience difficulties in formulating a research problem (12.9%), as well as in the research skill of analysis and in information processing, where 72.6% are at levels considered adequate.

Yoza and Villavicencio (2021) conducted a study in Ecuador, where 75% and 85% of students lacked cyber competencies in information management and information security, respectively. Fernández et al. (2022), for their part, found that research skills among dentistry students at a private institution were at a medium or average level (58%), followed by a deficient level (36%), with difficulties observed in searching for scientific-level information, data analysis, and methodological procedures.

Likewise, in Chile, Silva-Quiroz et al. (2022) argue that students have a basic level of cyber competence, making it necessary to incorporate more competencies in digital machine security. In the same field, in Mexico, Acosta et al. (2022) identified that students can develop research skills through a virtual course; moreover, it is recognized that the virtual modality provides students with speed in carrying out tasks related to research capabilities.

At the national level, Suárez-Guerrero et al. (2020) argue that significant differences can be highlighted in the assessment of cyber competence according to gender, place of birth, and type of research skills. Rojas et al. (2024), for their part, maintain that Peruvian students have a medium level with a tendency toward a high level of self-reported cyber competence, with no significant differences by sex. On the other hand, according to Espinoza and Sernaqué (2021), there is a deficient level of research skills among university students, who display a low and indifferent attitude toward research. Guevara (2021), in turn, found that few students are knowledgeable about cyber competencies; this cyber deficiency is associated with a lack of capacities, attitudes, and skills in the use of digital or technological devices when conducting scientific research. Huamán (2021), for his part, argues that students show greater strengths in the conceptualization and recognition of certain research skills, while assigning less importance to methodological and communication skills.

According to Paucarchuco et al. (2023), university students need to improve their cyber competencies in order to achieve academic performance in relation to research tasks. In addition, Rueda et al. (2022) state that students show a low level with regard to research skills, with 59.09% of surveyed students showing a low level in search skills and 50% of surveyed students showing a low level in research attitudes.

Ultimately, the aim of this study was to determine the relationship between "cyber competencies" and "research skills" among students of the Faculty of Education and Humanities at the Universidad Nacional de San Martín, Rioja (Peru). Likewise, it sought to determine the relationship between the dimensions of competencies and the variable "research skills," thereby allowing a more precise identification of how the use of digital resources influences aspects

such as information searching, source analysis, scientific writing, and the communication of results. Complementarily, considering contextual variables such as the availability of technological equipment, prior training in information and communication technologies (ICT), and academic support could provide a more complete view of the factors influencing research training.

METHODS

Study type and area

The study adopted a non-experimental design with a basic quantitative approach, whose purpose was to answer research questions and measure attributes related to social processes, in accordance with Bernal (2010). The scope was relational and cross-sectional, which made it possible to analyze the relationship between variables at a specific point in time without deliberately manipulating environmental conditions. The research focused on the generation of theoretical knowledge and the understanding of fundamental theoretical concepts without immediate practical application (Tarrillo et al., 2024). In this sense, the study was conducted in the Faculty of Education and Humanities at the Universidad Nacional de San Martín, Rioja campus, in Peru, and focused on the courses Research I and Research II. The study was carried out during the 2024-II academic semester, from August to December 2024, which made it possible to collect data within a defined and representative time frame for the corresponding academic term.

Population and sample

The population considered in the study consisted of 100 students from the Professional School of Education at the Universidad Nacional de San Martín, Rioja campus, Peru. These students belonged to the three specializations offered by the school (Early Childhood Education, Primary Education, and Secondary Education) and were enrolled in the eighth and ninth semesters during the 2024-II academic semester. To select the participants, a non-probabilistic convenience sampling method was used, mainly based on the accessibility and availability of the students. The inclusion criteria established were as follows: being enrolled in the eighth or ninth semester, belonging to one of the aforementioned specializations, and actively participating in the Research I course or in academic activities related to the field of research. In contrast, students who did not complete the applied instruments or who had prolonged absences that limited their participation during the data collection period were excluded. Similarly, informed consent was considered an essential prior condition for participation in the research.

Finally, the sample consisted of 55 students who met the established criteria. Of these, 35 were enrolled in the Research I course and 20 belonged to the Research II course, all distributed across the three specializations of the degree.

Variable and data collection instruments

To evaluate the variable "cyber competencies," a questionnaire designed by the researcher was used. This instrument consisted of 30 items distributed across five dimensions: cybersecurity strategy (6 items), cyber culture and society (6 items), education and training (6 items), legal and regulatory frameworks (6 items), and organization and technology (6 items). The response scale used followed a five-point Likert format: never (1), almost never (2), sometimes (3), almost always (4), and always (5). Regarding the validity of the instrument, it was evaluated by specialists with experience in the field, who considered that the questionnaire presented a satisfactory level of relevance and adequacy. Likewise, the reliability analysis showed a coefficient of 0.796, demonstrating that the instrument has sufficient internal consistency for application in studies of this type.

To measure the variable "research skills," a questionnaire adapted from the instrument proposed by Ayala et al. (2023) was used. The original instrument contained 30 items distributed across seven dimensions. For the purposes of this study, the questionnaire was reorganized by the researcher, establishing five dimensions that better fit the context and objectives of the research. These dimensions were structured as follows: exploratory (6 items), technological (9 items), methodological (3 items), analytical and interpretive (6 items), and written communication (7 items). As in the previous instrument, a five-point Likert scale with ordered categories was used: never (1), almost never (2), sometimes (3), almost always (4), and always (5). The questionnaire was administered through Google Forms during the 2024-II academic semester, in coordination with the instructors of the Research I and Research II courses in the specializations of Early Childhood Education, Primary Education, and Secondary Education. Regarding the validation process, specialists with experience in the field of

educational research evaluated the instrument and indicated that it showed a highly satisfactory level of adequacy. In addition, the reliability analysis yielded a coefficient of 0.899, demonstrating high internal consistency and confirming its suitability for use in research studies.

Data collection techniques and procedures

This study used the survey as the main method for data collection. The questionnaires were administered virtually to the participants, thus ensuring informed consent, confidentiality, and anonymity in all responses. This procedure is consistent with Creswell (2014), who maintains that structured instruments administered in controlled settings make it possible to obtain clear, comparable, and appropriate information for quantitative studies. Data collection was carried out during the 2024-II academic semester, in coordination with the Faculty of Education and Humanities of the Universidad Nacional de San Martín, Rioja campus, Peru. Before the fieldwork began, a letter of introduction was submitted and the corresponding institutional authorization was obtained. This process is aligned with Hernández Sampieri et al. (2014), who emphasize that all research must have formal approvals guaranteeing compliance with ethical, administrative, and academic principles, thereby ensuring the validity of the study and the protection of participants.

The surveys were administered virtually through the Google Forms platform, in collaboration with the instructors responsible for the Research I and Research II courses. The administration took place at times previously agreed upon with the instructors, taking advantage of periods assigned to complementary activities or tutoring sessions, between 9:00 a.m. and 10:00 a.m., and between 7:00 p.m. and 8:00 p.m., from Monday to Friday. Before answering the questionnaires, students were given a clear and detailed explanation of the objectives of the study, the nature of the variables under investigation, the confidential use of the information collected, and their rights as participants. This explanation was provided both verbally, in virtual sessions, and in writing in the header of the digital form, including the informed consent statement.

Each survey took approximately 20 to 25 minutes, which was sufficient time for participants to reflect on their responses without pressure. The anonymity of the data was guaranteed through the automatic coding of responses, and the collection of personally identifiable information was avoided. The procedure was carried out in accordance with the ethical principles of scientific research, ensuring the voluntary nature, privacy, and integrity of participants at all times.

Data analysis

For data analysis, SPSS statistical software, version 23, was used. Initially, the data were organized and coded in an Excel spreadsheet. Subsequently, descriptive statistical techniques, such as frequency distribution and measures of central tendency (mean, median, and mode), were applied to characterize the study variables. For inferential analysis, Spearman's correlation coefficient (rho) was used, which is appropriate for ordinal and non-normally distributed data.

Ethical considerations

Each student was provided with an informed consent form, which was administered digitally and clearly and comprehensibly detailed the objectives of the study, the procedures to be carried out, the possible risks and benefits, as well as the guarantee of confidentiality of the data collected. Participation was entirely voluntary, allowing participants to withdraw at any time without repercussions. The handling of personal information was carried out under strict confidentiality protocols, using coding and digital safeguarding techniques that restricted access exclusively to the principal researcher. In order to uphold ethical principles, a circular graph based on aggregated data was used.

Furthermore, the scientific integrity of the work was safeguarded through the honest handling of data, avoiding any form of manipulation or distortion, and ensuring the proper acknowledgment of sources and collaborators in order to prevent plagiarism and academic fraud. The study was aligned with the ethical standards established by the University, including approval of the project by the corresponding committee before the beginning of the fieldwork, especially with regard to the responsible treatment of research participants.

RESULTS

The variable "cyber competencies" was evaluated through five dimensions, each composed of six items, for a total of 30 items. The results show a predominance of the medium level across all dimensions, with "education and training" (76.4%) and "organization and technology" (58.2%) standing out as

Table 1
Cyber competencies by dimensions

Dimension	n = 55					
	Low		Medium		High	
	fi	%	fi	%	fi	%
Cybersecurity strategy	10	18.2	42	76.4	3	5.5
Cyber culture and society	3	5.5	36	65.5	16	29.1
Education and training	9	16.4	42	76.4	4	7.3
Legal and regulatory frameworks	1	1.8	23	41.8	31	56.4
Organization and technology	0	0.0	23	41.8	32	58.2

the most consolidated. This reveals a functional level of cyber competence, although with opportunities for improvement in aspects such as cyber culture and regulatory frameworks (see Table 1).

The overall analysis reveals that 90.9% of the students were at a medium level of cyber competencies, while 7.3% reached a high level and only 1.8% were at a low level. This profile suggests that students possess functional skills for interacting with digital environments, although advanced competencies related to security, digital ethics, and technological management still need to be strengthened (see Table 2).

The variable "research skills" was evaluated across five dimensions: exploratory, technological, methodological, analytical and interpretive, and written communication. The results show that most students were at the medium level, especially in the exploratory (63.6%) and technological (63.6%)

Table 2
Overall level of variable 1: cyber competencies

Cyber competencies	n = 55	
	fi	%
Low	1	1.8
Medium	50	90.9
High	4	7.3

dimensions, indicating a solid foundation in search processes, information management, and the use of digital tools (see Table 3).

The overall analysis indicates that 85.5% of the students showed research skills at a medium level, while 7.3% were at a high level and another 7.3% at a low level. This pattern suggests an adequate level of research training, although critical thinking, scientific writing, and methodological mastery still need to be strengthened (see Table 4).

In order to determine whether the data fit a normal distribution, the Kolmogorov-Smirnov test with Lilliefors correction was used. The results indicated that the variable research skills does not follow a normal distribution (p = 0.047), which justified the use of the nonparametric Spearman correlation coefficient.

A significant and positive correlation was found between cyber competencies and research skills (rho = 0.589; p = 0.000). Likewise, specific correlations between dimensions were evaluated, highlighting significant relationships in education and training (rho = 0.591), organization and technology (rho = 0.502), legal and regulatory frameworks (rho = 0.465), and cybersecurity strategy

Table 3
Research skills by dimensions

Dimension	Low		Medium		High	
	fi	%	fi	%	fi	%
Exploratory	4	7.3	35	63.6	16	29.1
Technological	4	7.3	35	63.6	16	29.1
Methodological	3	5.5	38	69.1	14	25.5
Analytical and interpretive	3	5.5	36	65.5	16	29.1
Written communication	4	7.3	35	63.6	16	29.1

Table 4
Overall level of variable 2: research skills

Research skills	n = 55	
	fi	%
Low	4	7.3
Medium	47	85.5
High	4	7.3

(rho = 0.357). No significant relationship was found between cyber culture and society and research skills (rho = -0.004; p = 0.977) (see Table 5).

DISCUSSION

Based on the findings obtained for the main objective, a positive relationship was found between the variables cyber competencies and research skills among university students. The dimensions cybersecurity strategy, social cyber culture, and education were those most commonly found at a medium level. Regarding research skills, the exploratory, technological, and written communication dimensions were also found at a medium level. This means that the level reached in both cyber competencies and research skills is highly significant.

These results are consistent with the studies by Villamizar-Arciniegas et al. (2023), who argue that the level of cyber competencies was intermediate (54.7%) among students in medical-surgical specialties in Colombia. Furthermore, Oseda Gago et al. (2021) reported that 65.07% of students were at a good level in cyber competencies; similarly, regarding research skills, they found that 63.01% were at a good level. These authors indicate that most students display cyber competencies at medium levels; it is also worth noting that research skills are likewise found at medium levels.

These findings are in line with the theories of Siemens (2004), with his well-known postulate for understanding cyber competencies and research skills. Individuals focus on the interconnection among cybersecurity, digital culture, education, and technologies. For his part, Flavell (1985) formulated his postulate regarding research skills, theorized through metacognition, that is, the ability to plan, monitor, and evaluate the research process, identify effective strategies, and regulate one's own learning.

As Dominioni and Persi (2023) state, cyber competencies are the combination of policies and regulations, processes and structures, social networks, people and skills, and technology necessary to implement digital security between humans and machines in cyberspace. These theorists underscore the importance of a holistic approach to cybersecurity and digital research. It is not simply a matter of mastering technical tools, but of cultivating a mindset of continuous learning, critical thinking, and scientific problem-solving.

Concerning cybersecurity and research skills, it was found that cybersecurity strategy has a significant impact on the development of research skills among university students. Here, the indicators incident response, information management, and communications were considered at a medium level by 76.4% of respondents. Regarding the elements consultation of reliable sources, and interpretation of online information, these were found at a medium level in 65.5% of respondents. This means that individuals prevent attacks from malicious websites, protect and responsibly communicate scientific data, and thus show a positive relationship with

Table 5
Relationship between cyber and research dimensions

Relationship analyzed	Spearman coefficient	Significance (p-value)
Cyber competencies ↔ Research skills	0.589	0.000
Cybersecurity ↔ Research skills	0.357	0.007
Cyber culture ↔ Research skills	-0.004	0.977
Education and training ↔ Research skills	0.591	< 0.001
Legal and regulatory frameworks ↔ Research skills	0.465	< 0.001
Organization and technology ↔ Research skills	0.502	< 0.001

the consultation of online books, scientific articles, information, and scientific writing.

These data are consistent with the studies by Oseda Gago et al. (2021), who found that 65.07% of students were at the medium level in cybersecurity strategy. Likewise, with regard to the categories exploration, technology, and communication, they observed that 63.01% were at a medium level. For their part, Quispe and Aliaga (2022) found a significant increase in the general quotient of cybersecurity strategy in the dimensions of scientific production, problem-solving, communication, and information. These authors explain that most students were at a medium level in the relationship between cybersecurity and the items consultation of reliable sources, and interpretation of online information. This is consistent with this study because similar findings were obtained.

To strengthen these findings, we cite other authors who contribute their respective theories. Such is the case of González (2005), who proposed addressing cybersecurity risks through the capacity to act responsibly in handling online data information. In another theoretical contribution, Novikov (2016) mentions that cybersecurity strategies are based on a set of skills and abilities that enable individuals to control and evaluate relevant information. For his part, López Balboa (2001) argues, based on exploration, that individuals must seek out the problem and its solution through scientific intelligence. Based on these theoretical contributions, digital security is of utmost importance for the quality of the scientific information we use in scholarly work.

Regarding cyber culture in society, it is evident that no relationship was found between cyber culture and society and research skills among humanities students. Although the indicators social networks, internet security, and information mechanisms were at a medium level, the indicators techniques, statistics, and interpretation of information were also at a medium level. This means that learners, despite having medium levels in the use of social networks, the internet, and information found in databases or scientific information search engines, do not use these resources to enrich their own research skills. This has repercussions on how different statistical and inferential techniques, as well as descriptive analyses, normality tests, and hypothesis testing, are used. These data are related to the study by Crisanto and Vásquez (2023), who showed that the level of learners' research skills was low in 84% of cases. The authors of that study mention that there was no strong relationship between their study variables. This is consistent with what was found in this study. Similarly, no other authors were found who supported the absence of a relationship between the study variables.

Regarding education and training in research skills, the results show a significant positive relationship between education and training and the development of research skills among humanities students. In the elements related to awareness and technology, these were considered at a medium level; likewise, the items concerning updating bibliography, application of APA standards, and bibliographic managers were also at a medium level. This means that most learners show education in media literacy and training in selecting scientific information and techno-digital tools for research. This is strongly associated with informed consultation of scientific literature and authorship citation through the application of APA standards, which allows for the orderly writing of scientific documents; furthermore, digital artificial intelligence tools are used as support for scientific work.

These data are consistent with the studies by Ochoa et al. (2022), who showed that ICT makes it possible to acquire lasting research skills in individuals. In the scientific production of Fernández (2024), it was confirmed that communicative research skills have a positive and moderate correlation with higher-order thinking. These authors state that students are immersed in information and communication technologies, thereby acquiring research or communicative skills. This supports what was found in this study. To reinforce the findings and data, we cite specialists who contribute their theories. For example, Vygotsky (1978), based on constructivism, postulates that individuals engage with technology as a tool for constructing knowledge in an active and meaningful way. For their part, Bandura and Ramachaudran (1994) ground their theory in a series of motivational capacities and attitudes toward research processes. In Krippendorff's (1985) explanation, he argues that education and technology are the set of tools or resources necessary to strengthen the elements inherent in research skills. Based on these theoretical contributions, ongoing education and training enrich motivational capacities within the research process.

With regard to the legal and regulatory framework in the area of research skills, a positive relationship is observed between legal and regulatory frameworks and the research skills of humanities students. Thus, the items plagiarism detection systems, legal

framework, and cybercrime were correctly rated at a high level. In addition, the items related to scientific validity of information and the validity or reliability of measurement instruments were also found at a high level. This reinforces the premise that individuals have the capacity to respect the intellectual property of scientific information available online, use resources to detect plagiarism, obtain permission to use protected material, and protect data that could be stolen by hackers. This is strongly correlated with the verification and quality of scientific content found in digital texts and with meticulous responsibility regarding the validity or reliability of measurement instruments used to assess the study variables.

These findings are consistent with the studies by Rojas-Hernández et al. (2021), who found skills related to security and risks in the interaction between machines and scientific subjects. Likewise, Quispe and Aliaga (2022) found a positive increase in legal frameworks, as well as in the areas of problem-solving and cybersecurity. These authors describe the relationship between cybersecurity regulations and the moderate presence of online risks.

To reinforce the findings and data, authors with their respective theories were cited. González (2005) emphasizes the individual's capacity to protect life and integrity in the face of cyber pressures, as well as the ability to build positive life behaviors despite difficult circumstances in the digital context. In Flavell's (1985) study, he argues that within the cognitive context, individuals are capable of processing information and acting critically in favor of feasible instruments and resources for research work. Reinforcing the above, Dominioni and Persi (2023) argue that regulation of the interaction system within the human-machine duality is responsible for the quality and effectiveness of scientific content. These theoretical contributions allow for a more complete understanding of legal systems in support of the potential and quality of scientific work.

Concerning organization and technology in relation to research skills, a considerable positive relationship is evident in the topics addressed among humanities students. Thus, the dimensions organization and technology were considered at a high level. In addition, the indicators related to the formulation of objectives, methodological pathways, results, discussion, and technological tools were also found at a high level. This confirms that learners organize and respect the structure of the project and thesis report required by their respective institutions, as well as ICT, which is significant with reference to problem formulation, research objectives, methodological pathways, results, and discussion.

These data are consistent with the studies by Ochoa Guevara et al. (2022), whose results showed that, by implementing ICT, individuals acquire skills for the formulation of problems, research objectives, methodological pathways, and results. The same applies to the scientific production of Calle Peña (2021), who found that there is a strong and positive relationship between the competence of organization and technology and the teaching-learning process in relation to the structure and framework of research projects.

These authors explained that organization is the principal source for the practice of respecting the structure of research projects proposed by institutions. To reinforce the data, scholars and their respective theories were cited. For example, Vygotsky (1978), through constructivism, emphasizes the role of technology as a tool for constructing knowledge in an active and meaningful way. To strengthen this theory, Bandura and Ramachaudran (1994) were also cited, as they ground social cognition in a series of capacities and beliefs that individuals possess in relation to their levels of performance within the research process. For their part, Machado Ramírez et al. (2008) emphasize that organization is an essential source for solving research tasks within the research field itself, using the resources of scientific methods. Based on these theoretical contributions, organization enables efficient development in all aspects of the research process.

For all the reasons mentioned above, the study reinforced the importance of raising awareness about the need to receive training and education in the responsible use of digital platforms, especially for protecting data related to scientific dissemination and relevant scientific content, as well as for responding to piracy, plagiarism and improper attribution of authorship, and ensuring trust in scientific information available on digital devices. Furthermore, the consultation of sources, books, scientific articles, theses, and the search for information in repositories and specialized libraries with scientific support are positively related, including the use of Microsoft digital tools and written language based on precision and clarity in writing.

Although the findings of the study offer a valuable view of cyber competencies and research skills in the context of university education in the San Martín region of Peru, it is important to acknowledge certain limitations. First, the sample size (n = 55) and its geographic origin restrict the generalization of the results to other educational contexts. In addition, the use of self-administered instruments may have

influenced the participants' subjective perceptions, generating social desirability bias. On the other hand, the quantitative approach made it possible to identify general trends, but not to explore in depth the motivations, experiences, or individual barriers that influence the development of these competencies. Finally, the study focused on previously defined dimensions, which may have excluded other emerging skills relevant in cyber and research environments. These limitations open opportunities for future research using mixed methods, larger samples, and longitudinal analyses that make it possible to better understand the evolution of these competencies in university populations.

CONCLUSIONS

Cyber competencies are related to research skills through a strong and positively oriented correlation, which strengthens digital capacities, instrumental mastery of technology, and promotes the development of cognitive and methodological processes associated with scientific research. Consequently, students or professionals with greater cyber competence show superior performance in the search, analysis, interpretation, and management of information, which directly affects the quality of their academic and scientific work. Ultimately, the findings reaffirm the need to promote training strategies that integrate digital literacy as a cross-cutting axis of academic work, in order to enhance both student autonomy and the soundness of their research practices.

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JDR: Principal investigator responsible for the methodological design, development of the cyber competencies assessment instrument, statistical data analysis, drafting of the Introduction, Results, and Discussion sections, coordination of instrument administration, and communication with the institution.

JVR: Administration of the instruments, systematization of the collected information, and literature review.

JFGP: Adaptation of the research skills instrument, organization of the data into analysis matrices, and preparation of the conclusions.

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