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Mobile Device Use in the Development of Research Skills in Students at a Public University in the Cajamarca Region

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Abstract- The development of research capacity is a variable that demands attention in students of the various universities in the world, they need to use tools that facilitate access to information required for research work, all university students have a mobile device; however, it is not used for research, despite having applications for access to reliable and interesting information. The problem statement sought to test the influence of the use of mobile devices on the development of research skills. The study was quantitative in approach, applied with a quasi-experimental design, worked with 140 students from a public university in the Cajamarca region, divided into two groups, Control and Experimental; a pre-test was applied to both, where average differences of less than 0.071 were obtained in the dimensions and variable; the use of the mobile device determined that it was favourable for the GE, demonstrating that all students accessed information according to the guidelines of the research work. The application of the post-test proved that there are significant differences in the development of research skills, by obtaining average differences of more than 2.929 points in the dimensions and variable; the statistical values showed that there is a significant influence of the use of the mobile device in the development of research skills, by obtaining an associated bilateral critical level < 0.001, a result of less than 0.05, which accepts the hypothesis put forward.

Key words: mobile device, development and research skills.

I. Introduction

The use of the mobile device to develop research in educational institutions at all levels of education goes unnoticed on the planet, the fact was visualised during the spread of the pandemic of COVID-19, when the only way to access the development of classes was remote education through the use of radio, television or mobile devices, however only used as receivers, neglecting the development of research skills demanded by the training of students in basic education and to a greater extent non-university and university higher education. The United Nations Educational, Scientific and Cultural Organisation, reported that 1.2 billion students worldwide at all levels of education did not have access to remote educational development [1]. The fact reaffirms that the problem was alarming not only in basic education, but also at the level of higher education institutions, especially in the public sector, which, faced with the lack of connectivity of students and the implementation of virtual education platforms, the authorities on duty had to implement the development of remote education using free applications offered by Google's automated search engine. Post pandemic, the problem still persists, as there are universities that still lack internet service and do not have a virtual learning platform, claiming that they lack resources, which undermines the possibility of implementing the development of blended and virtual programmes as private universities are developing, generating the income of resources to the corresponding institutions. The United Nations Educational, Scientific and Cultural Organisation [2], states that as a result of the pandemic crisis caused by COVID-19, the higher education system has been implementing new forms of education in order to contribute to the achievement of the Sustainable Development Goals (SDGs), highlighting teacher training in the management of virtual environments to develop content and evaluation systems and even encourage the development of the various types of research demanded by higher education institutions. However, in many public universities and higher education institutions, the reality is far from UNESCO's proposal.

Latin America, due to the fact that it is made up of developing and underdeveloped countries, affected by the enormous gaps in educational results, expressed in the unequal distribution of teachers, lack of connectivity in urban and rural areas, opted to suspend face-to-face educational work and opt for remote education, using applications and social networks that went unnoticed. La UNESCO stresses that of the 33 States that make up the region, 29 suspended face-to-face classes, affecting more than 165 million students; in view of this situation, 29 countries decided to continue developing distance education, 26 implemented the use of the internet, 4 with

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exclusive live online virtual platforms such as the Bahamas, Costa Rica, Ecuador and Panama, 23 countries implemented radio or television educational programmes [1]. The problem induces the educational protagonists to reflect on the implementation of virtual education, to prepare themselves academically to use digital technology and to implement strategies that promote the use of mobile devices as a means to access databases and obtain information that demands the development of research skills of university students.

In Peru, the problem of the use of mobile devices to undertake research in the university system is still unnoticed, as far from being used as an educational resource, it is conceived as a distractor, prohibiting its use during the development of educational activities. The reference [3] states that the use of mobile devices by university students went from being a distractor to an educational tool in the development of virtual classes during the pandemic, however, during the return to face-to-face classes, its use is once again being prohibited because it is considered a promoter of addiction to social networks. This statement allows us to interpret whether the use of mobile devices facilitates the development of research skills, and the answer is that it is the teacher who has the responsibility to promote their use as educational resources, as it promotes access to the information media required for the development of educational activities, taking into account that in the classrooms of various public and private universities there is a lack of access to the internet and it is only limited to the use of computer rooms by teachers who develop subjects related to ICTs. In the framework of the Peruvian University Law 30220, the university system must implement educational programmes with curricula that promote the development of research from the various areas or subjects, with teachers being responsible for articulating formative research and social responsibility in the development of the syllabuses, setting as a product the development of an academic work, which is where it should promote the use of mobile devices to investigate and obtain the information demanded by the research work.

The Cajamarca region currently has three licensed national universities, each offering professional careers in accordance with the licensing indicators verified by the National Superintendence of Higher University Education (SUNEDU), as well as the guidelines demanded by the University Law. The reference [4] explains that, as a result of virtual classes, the education of students was affected by the development of remote classes, due to the fact that teachers were not prepared in didactics and virtual teaching methodology and above all the economic and social inequality of the students, where the internet signal does not reach, which made it difficult to access the development of virtual classes, a fact that to date remains intact. The phenomenon is expressed in university education, which far from encouraging the use of digital devices for the development of research skills, is still seen as negative tools to be used in access to social networks, however, it is not reflected on the use of mobile devices that all students have and that only enough to train them in access and management of academic search engines to obtain information to support educational activities, or the case of YouTube tutorial to verify the methodological procedures in the development of formative research.

This is not alien to each of the national universities in the Cajamarca region, which do not have their own virtual platform for the development of educational activities, since, at the time of COVID-19 they had to adapt to using Google applications, such as Classroom or the Microsoft team's application, as well as implemented with mobile device chips or tablets, for university students to access virtual classes. Unfortunately, many students had serious difficulties in accessing classes via the Google Meet, Microsoft Teams or Zoom application due to lack of connectivity, or because they were located in places inaccessible to the internet. This fact limited the normal development of academic activities, making it necessary to return to face-to-face classes, since it was assumed that their university had implemented internet connection in the classrooms and that they could develop their classes with access to institutional repositories or databases to acquire the information required for research work; However, this did not happen, as to date there is no internet service and it is the students who, of their own free will, use their mobile devices to access the search for information required for research practice. Given the above, the study posed the following problem: How does the use of mobile devices influence the development of research skills in students at a public university in the Cajamarca region?

Having formulated the problem, the study was justified because it made it possible to verify whether teachers and students are using mobile devices to access the information required to develop the capacity for formative research in a transversal manner in each of the subjects from the classroom, as established by the Institutional Educational Model, which promotes work by results. Methodologically, the study promoted the use of mobile devices, following processes to access databases to obtain the sources that support the contents required by the protocol for writing the academic paper. In practical terms, the study allowed the teacher and students to reflect on the results obtained, according to the progress of the research work product undertaken in the academic cycle, as well as to make appropriate use of the devices as an educational resource in the search for information to support the research work.

The main objective of the research was based on the general objective: to check the influence of the use of mobile devices in the development of research skills in students of a public university in the Cajamarca region 2023; having as specific objectives: diagnose the development of research capacity in students of a public university in the Cajamarca region, 2023 through the application of a pre-test; use the mobile device in the development of research capacity in students of a public university in the Cajamarca region, 2023; test the development of research capacity in students of a public

university in the Cajamarca region, 2023; and demonstrate the influence of the use of the mobile device in the development of research capacity in students of a public university in the Cajamarca region, 2023. The hypothesis was: there is a significant influence of the use of mobile devices on the development of research skills in students at a public university in the Cajamarca region, 2023.

Among the antecedents that support the research in the international context is the reference [5], in the article: Adequate use of digital devices in the teaching-learning process COVID-19 times, worked with the aim of investigating the strategies and alternatives used by students to self-learning using digital tools to improve learning, the study was quantitative analytical approach, descriptive non-experimental, was conducted with a probability sample of 84 students, who responded to a Likert-type virtual questionnaire based on the technological equipment that is available, the time used and application in research; The results report that electronic devices connected to the internet favour access to summaries of reports and scientific articles on a research topic. The study concludes that the appropriate use of digital devices is a tool that facilitates obtaining the information required for teachers and students to organise the appropriate information based on previous knowledge and new information with the help of teachers. The reference [6] in the article: Mobile devices as an educational strategy in the public university in face-to-face mode from the experience of undergraduate students and teachers, developed with the aim of presenting a critical reflection on the use of mobile devices, the study was of bibliographic type, of analytical summary method of research, according to answers obtained from the analytical questions, using cards where the necessary elements demanded by the corresponding source were recorded; Among the results, the general philosophical approach was highlighted, specifying that globalisation makes demands on the education system of the countries of the world, specifically in the use of ICTs, demanding the implementation of strategies to use it in the education system; in the general epistemological approach, it was verified that progress is being made in the use of digital technology in face-to-face and distance education, highlighting that ICTs are fundamental tools of socio-constructivism for accessing universal knowledge; the specific epistemological approach that proposes the use of digital technology in research due to the easy access to bibliographic sources, being fundamental the articulation of information technology with the educational system to promote the achievement of learning; in the perspective of the learner it is specified that the mobile device is a new paradigm in the education of students, since it allows them to access multiple applications in order to obtain information according to the subject matter presented digitally. The reference [7], in the scientific article: Quantitative analysis of the relationship between the use of mobile devices and labour productivity in a business environment, developed with the aim of determining the relationship between variables in the business environment, the study was quantitative, non-experimental, cross-sectional, correlational approach, working with 350 subjects studying professional careers related to the business area of the State Technical University of Quevedo, who answered two questionnaires related to entrepreneurship; The results show that for the majority of respondents, there is a high level of use of mobile devices in the various actions that demand labour productivity, there is also a relationship between the variables by obtaining a p-value of 0. 000 < 0.05, confirming the hypothesis; with statistical data it was concluded that in a good business organisation entrepreneurial projects are constantly developed, as long as they are well structured, there is also a high level of use of mobile devices and a significant relationship between the variables established.

At the national level, there is the research of [8], who in his article developed with the aim of analysing the digital entrepreneurship developed by higher education students, based on a systematic review of 5870 scientific articles published in the last 7 years in databases of journals indexed in Scopus, ProQuest, EBSCO, Scielo and institutional repositories, reviewed using the PRISMA method, 12 articles were selected that publish digital entrepreneurship, where most were quantitative in approach, a minority qualitative and only one mixed; The results show that digital entrepreneurship has a vision of entrepreneurship and is linked to entrepreneurial skills. With the information it was concluded that in higher education the students' conception of digital entrepreneurship is not uniform, some highlight entrepreneurial appearances, others associate the social dimension with the entrepreneurial one in parallel; the problems faced by students in digital entrepreneurship are digital skills and financing. La reference [9], in their scientific article: Perspectives on the adoption of mobile technology in Peruvian university education, developed with the aim of identifying the acceptance of m-learning programmes at postgraduate level, a qualitative deductive study, conducted with 12 managers of private and public universities in Ancash, responded to an interview; The results indicate that the use of mobile devices helps to run interactive software in the development of learning and that they are fundamental tools to undertake not only individual work, but also teamwork; the study concluded that mobile technology allows interaction between students sharing appropriate and timely information to work in teams and cooperatively in situ in the classroom, facilitates self-learning and above all allows access to obtain information in real time and in a timely manner. La reference [10], in the thesis: Dispositivos móviles y satisfacción del estudiante en la modalidad no presencial en tiempos de COVID-19: Caso Facultad de Ciencias Administrativas y Recursos Humanos USMP, developed with the objective of determining the relationship of the variables, work of quantitative, correlational, transversal, non-experimental approach, executed with 270 students who answered a questionnaire, the answers specified that there is a slight positive rho correlation between the use of mobile devices and student satisfaction of 0. 338 with a bilateral significance of 0.000 < 0.01; the statistical data allows us to

conclude that there is a significant relationship between the variables and that the greater the usefulness of the mobile device in the construction of learning, the greater the satisfaction of the students.

In the region, the study by [11], developed with the aim of analysing mobile phone addiction in university sociology students at the National University of Cajamarca, a descriptive, quantitative study carried out with 189 students who answered a Likert-type questionnaire with questions related to mobile phone use, abuse and addiction, as well as items referring to personality traits, spending on games and applications; The answers indicate that mobile phone addiction is determined by the free time that students have when they have research tasks as it is considered a means of entertainment, they specify that the expenses are framed in the recharges they make to their devices and that it is planned, they consider that it is a medium that facilitates access to the information they need to consolidate the work left by teachers and when research is encouraged in the classroom it serves as teaching material to consolidate their learning; with the analysis of the information the study concluded that addiction to mobile devices is determined by the free time students have when they have research tasks as it is considered a means of entertainment: that addiction to mobile devices occurs when teachers do not promote their usefulness in the development of educational activities, as it is a digital tool that promotes the search for and analysis of information according to the demands of the subject matter being addressed in each class.

Among the theoretical bases, the definition of mobile device stands out, conceived as a tool that linked to the internet facilitates accessing and processing information of interest, thanks to the operating system that allows downloading and using applications that induce the generation of new knowledge. It defines the mobile device as a portable computer composed of various digital tools, which when manipulated, not only allows users to make or answer calls or access social networks, but also to obtain information of various kinds; it is a medium that contributes to the development of learning, since it provides access to information of interest in real time [12]. Thanks to research and innovation, the new mobile devices allow easy access to various information search engines, so its inclusion as a tool for developing research is essential, since its easy portability allows access to information of interest in situ in the classroom and through research allows the development of new knowledge.

The dimensions of the use of the mobile device are expressed in the access to the information required for the development of the research work, i.e. the usefulness of the device in the search for information, sharing information through social networks, use as a means of writing using office tools and accessing repository databases and indexed journals; generation of expenses, linked to the cost of the device and the expense it generates in recharges or fixed plans to have the connectivity demanded by its usefulness in the development of the classes; Valuation, expressed in the satisfaction and value of the information obtained in the context of the work being researched; and socialization, shown in the exchange of information between students or members of the work team, according to the content demanded by the writing of the research work [13].

It is no secret that the educational system demands to articulate digital technology in the teaching-learning process, being the mobile device one of the main tools that would help to promote the development of research, it will only depend on the teacher to establish standards for its use in the classroom. It is specified that the use of mobile devices as a didactic resource helps to acquire learning skills by interacting with the acquisition of the required information, enhances research through access to reports from international organizations, articles and research work undertaken by the academic community [14].

Using ICTs in the development of research work has important advantages, since it allows obtaining updated information according to the demand of the work undertaken, it is enough to have a device connected to the internet to access the information; one of the essential tools is the mobile device, not only because it is easily portable, but also because all students in the university system have a cell phone. The reference [15], emphasizes that educational development is framed in active learning, using media and materials that allow teachers and students to interact in the construction of new knowledge, from this perspective a fundamental tool that is available to educational actors is the mobile device, not only used as a means of communication, but it is a fundamental tool to undertake formative research from any area of study. From such a statement, it is a medium that facilitates access to information of interest, to then analyze and interpret it and build new information following writing guidelines demanded by the Royal Academy of the Spanish Language (RALE) or the use of writing standards APA, Vancouver, Chicago, among others.

From the negative point of view, the use of mobile devices in the classroom is conceived as a means of distraction for students, given that at the slightest carelessness of teachers, students immediately use the devices to access applications that have nothing to do with the development of learning. The reference [16] specifies that after the pandemic, the return to face-to-face education makes the use of digital tools indispensable, since as a result of virtual education, students have developed digital skills and it is the teachers who have to plan the use of such tools in order to interact in virtual environments during the development of learning; One of the main difficulties is that many educational institutions do not have computer centers, nor internet access, seeing the only possibility of using mobile devices or tables despite being seen as educational distracters; however, it is the driver of learning, who plans its use, establishing rules that allow disciplining the utility at the right time, inducing students to demonstrate the new learning obtained from the use of the mobile device.

The development of the research capacity of university students is defined as an individual process used by students to carry out their research work, following the guidelines established by the research writing protocol of the respective university. Research capacity is defined as the process used by the student to achieve high cognitive, affective and psychomotor skills in the development of a research work [17]. From the applicability of the University Law, teachers and students must undertake the acquisition of research skills through the development of formative research, where they seek rationality, reflection and criticism when contextualizing the development of research work. In order to develop research skills, any research work starts from the attention to a problem, demands the description of the contextualized and inductively grounded reality, induces the formulation of the problem, the establishment of objectives, the justification that explains the reasons why the research will be developed, the establishment of hypotheses, the support of the development of the work with background, definitions and grounding of the variables, the methodological process, the description of the results, the elaboration of conclusions articulated to the problem and objectives and recommendations to the agents investigated.

Among the dimensions of the development of the research capacity are the problematization, which consists of acquiring knowledge from observation, the deductive context of the study leading to the description and formulation of the problem, justification, the establishment of objectives, and hypotheses; the foundation, articulated to the skills used in the search for information, to specify the background at international, national, regional and local level, the theoretical bases in accordance with the variables, and the definition of basic terms in accordance with the study; and attitudes and values towards research methodology, which describes the type, level and design of the research, highlights the population, sample calculation and sampling of the subjects or objects involved in the study, the techniques and instruments used to collect the information, the methods and techniques of information processing and ethical principles, (the methodology will vary according to the type of research undertaken by the student); and the verification, expressed in the results and discussion in relation to the problem and objectives, as well as expressing the conclusions and recommendations articulated to the objectives and results that make it concrete [18].

The theoretical bases that support the development of research skills are the epistemic approach of quantitative and qualitative and mixed research set out by [19], who mentions that the quantitative approach is conditioned to follow processes of statistical techniques in the tabulation, presentation and analysis of the results according to the objectives pursued, it is helped by the hypothetical deductive method, it is mostly used in the educational field, natural sciences, psychology, physics, physiology, chemistry, neurology, etc. In the qualitative field, it sticks to descriptive processes of categories and subcategories through the analysis of discursive information, it demands in-depth analysis of the phenomenon studied, in order to understand and explain by means of epistemic approaches typical of the inductive method. The mixed approach requires qualitative and quantitative processes, it is used to better understand the problem to be investigated, it allows the study to be approached in a theoretical and practical way, its use is advisable in dense social research that generates complex questions, which require interdisciplinary answers to have a complete understanding of the subject of study [20].

Among the theories that respond to the study are the critical and dialectical theory that guides the development of a good rational human society, stressing that knowledge is not in the mind, but in reality. The reference [21], specify that the acquisition of knowledge is subject to the transformation of reality, where social practice inserts all humans in a liberating practice, demands interaction and approach of diverse elements that seek the transformation of society from the construction of a rational conscience. The development of research skills requires the use of tools that allow access to information that supports the study undertaken, in this logic the use of mobile devices becomes a fundamental means to search for information, analyse it and have a reflection of the deductive reality of the research problem addressed.

Another fundamental theory is that of explanation-understanding dualism, which has its principles in the relationship of ideas - problem, which allows to distinguish different ways of interpreting from approaches and foundations adopted by the human being, the basis of the theory is in the materialist and idealist dualism. The methodological dualism explanation - understanding starts from the dual process nature - culture, which leads to obtaining information from the context or environment in order to understand it and take it to creative and critical scenarios [22]. In such a circumstance, the development of digital technology makes it possible to act with information from different spaces, to then extract it comprehensively and describe it according to the interest of the research work.

II. METHODOLOGY

Following the approaches of the reference [23] the study was quantitative in approach, applied because it sought to develop the investigative capacity of the students in the sample, field study because information was collected and analysed in two moments, before the manipulation of the independent variable and then its corresponding manipulation to verify the influence on the dependent variable, the design was quasi-experimental, because we worked with Experimental Group (EG) and Control Group (CG), the results obtained verified the influence of the independent variable on the dependent variable.

The population consisted of 140 students in the first cycle of studies at a university in the Cajamarca region, who were distributed in four sections (35 students per section). The sample and sampling were intentional and consisted of the 140 students who formed part of the population, who were distributed in two groups: 70 corresponded to the experimental group and 70 to the control group.

The techniques used in the collection of information were observation to verify the research practice during the experimentation and the survey, which was used to formulate the items in relation to the dimensions of the dependent variable; the observation sheet was used as an instrument to record the research process during the development of the research work and the questionnaire was used for students to record the information required by each item, to then tabulate it and carry out the corresponding analysis [24]. The instruments were validated by three researchers RENACYT Level II, Level V and Level VII.

The processing and analysis of the results was carried out using descriptive and inferential statistics, the former to tabulate the responses in a database and then present them in tables and figures in accordance with the established objectives [25], and the latter to test the hypothesis after analysis of the Kolmogorov-Smirnov normality test using SPSSS 27 software, since the sample was larger than 50 subjects, and to determine the normal distribution of the data [26].

III. RESULTS AND DISCUSSION

In order to test the influence of mobile device use on research entrepreneurship with students from a university in the Cajamarca region, 2023, the information obtained in the pre-test and post-test was tabulated and the following results were obtained:

Table 1

Development of the research capacity of students at a public university in the Cajamarca region, 2023 through the application of a pretest

Dimensions / Variable	Group	Deficient		Regular		Total		Difference in $\bar{X}$
		fi	%	fi	%	fi	%	
Problematisation	GE	62	88.57	8	11.43	70	100.00	-0.471
	GC	52	74.29	18	25.71	70	100.00	
Substantiation	GE	42	60.00	28	40.00	70	100.00	0.043
	GC	34	48.57	36	51.43	70	100.00	
Verification	GE	46	65.71	24	34.29	70	100.00	0.071
	GC	41	58.57	29	41.43	70	100.00	
Research Capacity	GE	54	77.14	16	22.86	70	100.00	-0.119
	GC	53	75.71	17	24.29	70	100.00	

The results shown in table 1 indicate that the majority of frequencies between the results of the GE and GC pre-test are between the deficient and regular level, with an average difference of -0.471 in the problematisation dimension, 0.043 in substantiation, 0.071 in verification and -0.119 in the research capacity variable. The information shows that the development of research capacity in students of a public university in the Cajamarca region, 2023 before starting the experimentation process, there is no significant difference in the development of research capacity between the students of the GE and the GC.

Table 2

Mobile device use in the development of student research skills at a public university in the Cajamarca region, 2023

Dimensions / Variable	Group	Almost never		Sometimes		Always		Total	
		fi	%	fi	%	fi	%	fi	%
Access to information	GE	0	0.00	0	0.00	70	100.00	70	100.00
	GC	8	11.43	62	88.57	0	0.00	70	100.00
Cost generation	GE	0	0.00	0	0.00	70	100.00	70	100.00
	GC	0	0.00	0	0.00	70	100.00	70	100.00
Valuation	GE	0	0.00	0	0.00	70	100.00	70	100.00
	GC	0	0.00	0	0.00	70	100.00	70	100.00
Socialisation	GE	0	0.00	0	0.00	70	100.00	70	100.00
	GC	3	4.29	8	11.43	59	84.29	70	100.00
Use of the mobile device	GE	0	22.86	0	0	70	100.00	70	100.00
	GC	3	24.29	14	0	53	76.03	70	100.00

According to the verification results on the use of the mobile device, they indicate that in the CG the majority (88.57%) of students sometimes used the mobile device to access information that demanded the development of contents of their classes, while 84. 29% socialise information using the mobile device; the opposite occurred with the GE, 100% of students used the mobile device to access information searches, shared it using social networks, used it as a means of writing using office tools, as well as accessing repository databases and indexed journals to organise the information according to the demands of the research work, the utility generated expenses according to the plan contracted with the operator; the assessment obtained the corresponding satisfaction and value when producing the research work, which was socialised with the corresponding support.

Table 3

Development of the research capacity of students at a public university in the Cajamarca region, 2023 through the application of a post-test

Dimensions / Variable	Group	Regular		Good		Excellent		Total		Difference in $\bar{X}$
		fi	%	fi	%	fi	%	fi	%	
Problematisation	GE	0	0.00	40	57.14	30	42.86	70	100	3.600
	GC	28	40.00	42	60.00	0	0.00	70	100	
Substantiation	GE	0	0.00	44	62.86	26	37.14	70	100	2.929
	GC	12	17.14	58	82.86	0	0.00	70	100	
Verification	GE	0	0.00	51	72.86	19	27.14	70	100	3.143
	GC	25	35.71	45	64.29	0	0.00	70	100	
Research Capacity	GE	0	0.00	53	75.71	17	24.29	70	100	3.224
	GC	16	22.86	54	77.14	0	0.00	70	100	

The results shown in table 3 indicate that the majority of frequencies between the results of the post-tests of the GE are located in the good and excellent levels, in contrast to those of the CG, which are between the regular and good levels, with a difference of averages of 3.600 in the problematisation

dimension, 2.929 in substantiation, 3.143 in verification and 3.224 in the research capacity variable. The information shows that the development of research capacity in students of a public university in the Cajamarca region, 2023 after the experimentation process, presents significant differences in the development of research capacity between the students of the GE and the GC.

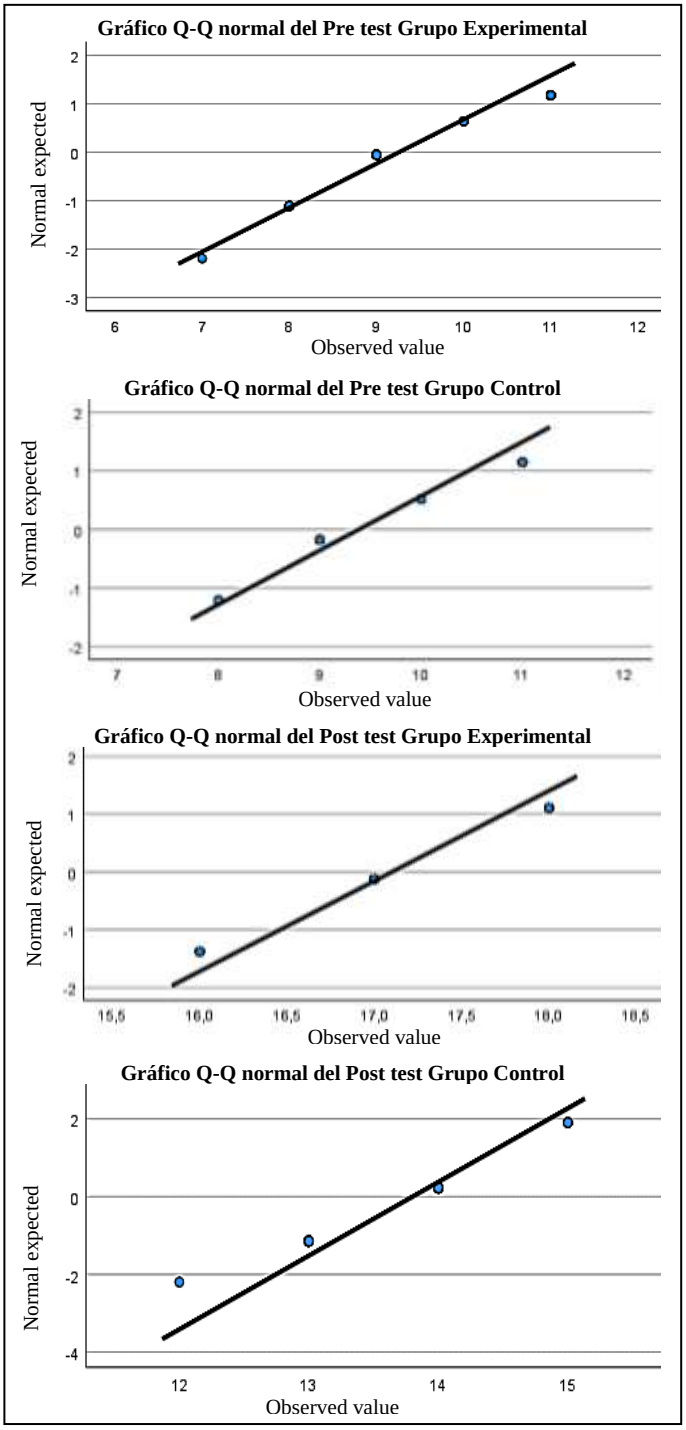

Figure 1 Analysis of the Kolmogorov - Smirnov normality pre test y post test

The data shown in figure 1, quantitatively presents the analysis of the Kolmogorov - Smirnov normality test for having samples greater than 50, the results show that there is a significance of 0.000, value > 0.05, indicating that there is an abnormal distribution, indicating that the contrast of the hypothesis is carried out using Student's t test for independent samples, as we have worked with two groups.

Table 4

Influence of the use of mobile devices on research entrepreneurship in students of a university in the Cajamarca region, 2023

Independent samples test

		Levene's test of equality of variances		t-test for equality of means						
		F	Sig.	t	gl	Sig. (bilateral)	Difference in means	Standard error difference	95% de intervalo de confianza de la diferencia Superior	Inferior
Pre test	Equal variances are assumed	0.158	0.673	-0.698	138	0.486	-0.129	0.184	0.236	-0.493
	Equal variances are not assumed			-0.698	137.960	0.486	-0.129	0.184	0.236	-0.493
Post test	Equal variances are assumed	1.050	0.307	33.277	138	<0.001	3.300	0.099	3.496	3.104
	Equal variances are not assumed			33.277	133.114	<0.001	3.300	0.099	3.496	3.104

The results of the pre-test shown in table 5, indicate that the levene's contrast (F) has equality or homogeneity of variance by obtaining a value of 0.158 greater than 0.05; also, the significance statistic of 0.698 shows that it is greater than 0.05; the values indicate that it accepts the hypothesis of equality of variance. The data of the t-statistic has values of -0.698 with associated bilateral critical level of 0.486, the result indicates that it is greater than 0.05 giving to understand that the GE and GC are in the same conditions of development of the capacity of investigation, when having closeness of means in the interval of confidence of the difference Superior and inferior between 0.236 and -0.493. The values of the pre-test results indicate that there is no significant difference in the development of research skills between the GE and CG students.

After using the mobile device during the development of the University Work Methodology classes for 14 weeks, having as a product the presentation and support of a research work, the post test was applied, where the results show that the levene contrast (F) has a difference or heterogeneity of variance by obtaining a value of 1.050 greater than 0.05; also the significance statistic of 0.307 shows that it is greater than 0.05; the values specify that it accepts the hypothesis of equality of variance. The t-statistic data has values of 33.277 with associated bilateral critical level < 0.001, the result indicates that it is less than 0.05 giving to understand that between the SG and CG there is significant difference in the development of research ability by having difference of means in the upper and lower confidence interval between 3.496 and 3.104. Therefore,

the values obtained in the post tes indicate that, there is significant difference in the development of research ability between the students of the SG and CG.

The information allowed us to understand how mobile devices contribute to the development of research skills, a fact that allows educational institutions and students to make the most of these technological resources; given that it is being demonstrated that the proper use of mobile devices improves research skills, inducing teachers to implement specific strategies to promote their efficient use. The digital era in which we live, demands the use of technological resources that are within reach of students, being the mobile device a medium that serves to access information that is available online.

Assessing how the use of mobile devices contributes to the development of research skills helps students to adapt to this environment and to use digital tools effectively, since determining whether mobile devices positively influence research skills can translate into an improvement in the quality of research papers, as students can frequently access and critically evaluate information and organise their findings efficiently.

DISCUSSION

The results in Table 1 show that most of the frequencies of the GE and GC pre-test results are between the deficient and regular level, with minimal differences in the averages in the dimensions and variable. The information is consistent with the study by [6], who verified that the development of research in university students is known through a diagnosis and that its improvement is undertaken using digital technology either in face-to-face or distance education, specifying that ICTs are the fundamental tools of socio-constructivism to access universal knowledge; it contributes to the theoretical approaches of [19], by highlighting that to identify the development of students' skills, a pre-test is applied, the results are used to make decisions and undertake the use of tools that stimulate the development of research.

The verification results on the use of the mobile device expressed in table 2 indicate that the majority of GC students sometimes used the mobile device to access information and socialise, according to the parameters demanded by the development of class content, with the opposite occurring in the GE where all students used the mobile device to search for, evaluate and socialise information, sharing it by using social networks, office tools, Google applications, accessing databases of repositories and indexed journals to organise the information according to the demands of the research work. The information validates the study by [5], demonstrating that the appropriate use of digital devices is a tool that facilitates obtaining the information required by teachers and students to organise the appropriate information based on previous knowledge and new information with the help of teachers; it contributes to the theory of [14], stating that the use of mobile devices as a teaching resource helps to acquire learning skills by interacting with the acquisition of the required information, enhances research through access to reports from international organisations, articles and research work undertaken by the academic community.

The results in Table 3 show that most of the frequencies of the results of the post-tests of the EG are located in the good and excellent levels, in contrast to those of the CG, which are between the regular and good levels, there being a significant difference in the averages in the development of research capacity. The information is in agreement with the studies of [9], in specifying that mobile technology allows interaction among students sharing appropriate and timely information to work in teams and cooperatively in situ in the classroom, facilitates self-learning and above all allows access to obtain information in real time and in a timely manner; contrasts with the results of the study of [8], by demonstrating that in higher education the conception of digital entrepreneurship of students is not uniform, some highlight entrepreneurial appearances, others associate the social dimension with the entrepreneurial one in parallel; the problems faced by students in digital entrepreneurship are digital skills and financing.

The results of the pre-test shown in Table 5, indicate that the t-statistic has values of -0.698 with an associated bilateral critical level of 0.486, the result indicates that it is greater than 0.05, implying that the GE and GC are in the same conditions for the development of research capacity, since they have mean closeness in the confidence interval of the upper and lower difference between 0.236 and -0.493. The results favor [15], statements by highlighting that educational development is framed in active learning, using means and materials that allow the teacher and students to interact in the construction of new knowledge; it also contributes to the applicability of the University Law, teachers and students must undertake the acquisition of research skills through the development of a formative research, where they seek rationality, reflection and criticism by contextualizing the development of research work.

After the use of the mobile device during the development of the University Work Methodology classes for 14 weeks, the results of the post-test show that the levene's contrast (F) has a difference or heterogeneity of variance of 1.050 greater than 0.05, specifying that it accepts the hypothesis of equality of variance. The data of the t statistic has values of 33.277 with associated bilateral critical level < 0.001 result less than 0.05 gives to understand there is significant difference in the development of the research capacity between the CG and GE. The Statistical data provide the research of [10], who found a slight positive rho correlation between the use of mobile devices and student satisfaction of 0.338 with a bilateral significance of 0.000 < 0.01; it contrasts with the study of [11] by stating that addiction to mobile devices occurs when teachers do not encourage its use in the development of educational activities, since it is a digital tool that promotes the search for and analysis of information according to the demands of the subject matter being addressed in each class; it contributes to the statements of [16], by highlighting that after the pandemic, the return to face-to-face education makes the use of digital

tools indispensable, since as a result of virtual education, students have developed digital skills and teachers are the ones who have to plan the use of such tools in order to interact in virtual environments during the development of learning.

IV. CONCLUSIONS

It was proven that there is a significant influence of the use of mobile devices in the development of research skills in students of a public university in the Cajamarca region, 2023.

With the application of the pre-test, it was diagnosed that there are no significant differences in the development of research skills in students of a public university of the Cajamarca region, 2023, by obtaining differences of averages less than 0.071 in the dimensions and variable between the students of the GE and the GC.

It was determined that the use of the mobile device in the development of research capacity in students of a public university in the Cajamarca region, 2023, was favorable for the experimental group, by demonstrating that all students accessed information according to the guidelines of the research work requested in the academic cycle.

With the application of the post-test, it was proven that there are significant differences in the development of research skills in students of a public university in the Cajamarca region, 2023, by obtaining differences of averages greater than 2.929 points in the dimensions and variable between the students of the GE and the GC.

It was demonstrated that there is a significant influence of the use of the mobile device in the development of research capacity in students of a public university of the Cajamarca region, 2023, by obtaining a statistical t value of 33.277 with associated bilateral critical level < 0.001, result less than 0.05 that gives to understand that between the GE and GC there is significant difference in the development of research capacity by having difference of means in the upper and lower confidence interval between 3.496 and 3.104. Therefore, they accept the hypothesis of the research posed research.

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