

## RESEARCH ARTICLE

# Comprehensive training guidelines from ethical research associated with information and communication technology and artificial intelligence

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**Abstract:** Currently, one of the challenges of higher education is to achieve the success of its students personally and professionally, emphasising improvement in technological, ethical, and academic areas that characterise human beings for success. Therefore, higher education must change the traditional way of training to a more humanistic approach framed in the digital era to solve social problems assertively. This research aims to generate comprehensive training guidelines from ethical research associated with Information and Communication Technology (ICT) and Artificial Intelligence to contribute to developing reflective critical thinking, maturity, and responsibility of individuals who will solve social problems. This study is based on Siemens’ theory of connectivism (2004), Kohlberg’s theory of moral development (1970), and Bandura’s social learning theory (1974). Under the interpretive phenomenological approach, the applied methodological route is qualitative, focused on realities addressed from the context of transformation, using the documentary review technique. The inquiry led to the conclusion of the importance of conducting ethical research processes within technology in higher education to provide the student comprehensively with the knowledge and skills for successful integration into society.

**Keywords:** ethical research, comprehensive training, information and communication technology, mobile learning, artificial intelligence

## 1 Introduction

Inquiry is inherent to human nature; this activity is carried out to discover the unknown or hidden to the researcher’s curiosity, especially in this new world sustained by Information and Communication Technologies (ICT) and artificial intelligence (Sarwari & Adnan, 2024; Papadakis et al., 2023). The aim is to discern adequately between the positive and negative, to generate knowledge with one’s criteria, achieving individual investigative autonomy under the ethical parameters of a progressive society (Ala & Najah, 2024). Thus, it eliminates barriers to access to knowledge as well as culture, managing academia, ethics, and technology as pillars of the integral education of the individual.

Following those above, higher education develops research skills in students (Athanasopoulos et al., 2023), incorporating them into the teaching-learning processes outlined in the curriculum to learn to formulate coherent problems with well-written objectives, which clarify research doubts and develop criteria for investigative autonomy with ethics, respecting what is exposed by various authors, avoiding copy and paste, as well as using inferential analysis to obtain knowledge (Jurayev, 2023).

Now, this investigative act on a specific topic requires knowledge of the area of science to be researched due to the student’s expansion of the various contents related to the chosen theme, combined with mastery of scientific methodology. This is why teachers and students must have the help of technology, such as data analysis provided by mobile technology along with its breakdown with the help of artificial intelligence, to generate more updated, faster, and coherent ideas with the environment regarding the problem and its possible solutions (Papadakis et al., 2023).

In this line of thought, there must be respect for the rules and ethical norms established in the search for a solution to the scientific problem, whether from a quantitative, qualitative, or

mixed perspective, because scientific research with the drafting of its respective report speaks volumes about the person doing it in terms of their maturity, communicative ingenuity, analytical, synthetic, interpretative, and even reflective capacity. Consequently, research tutoring in higher education must be of quality to positively project the institution represented in mutual support with technology, which, through connectivity, will provide the necessary support for knowledge quickly and efficiently.

## 2 Theoretical foundations

### 2.1 Scientific research, knowledge, maturity, and individual autonomy

Research is a data collection process, which comes from various sources, to interpret and understand the general principles of the topic of interest, as characterised by [Mar et al. \(2020: 15\)](#). It is dynamic and rigorous until it provides knowledge to humans to achieve maturity and clarity in thinking by implementing the necessary changes in the different realities to be transformed. Consequently, it allows for the perceiving, analysing, and even solving problems in daily life assertively according to the environment or circumstance.

In this context, we encounter scientific research relating to science and the scientific method. After careful analysis, we plan to find the best solution to problems unique and relevant to our research goals, which [Rodríguez \(2020: 19\)](#) defines as “finding answers to questions through scientific processes”. In today’s world, few problems are solved without prior research; therefore, solving a problem can be considered an insatiable search for answers to human dynamism in interacting with daily events.

In line with this, the power of research is demonstrated as it provides tools to individuals in their role as researchers, as expressed by [Niño and Mendoza \(2021\)](#), stating that it is a creative and innovative process that allows finding answers to problems to enrich knowledge and improve life, like current technology. Hence, it is necessary to reflect on the consequences of the research exercise, which depends on the rigour of studies, the socialisation of knowledge, and the ethical processes implemented to obtain or manage information by explaining principles, categories, laws, and theories.

In this regard, when researching and interacting with the object of study, the individual internalises its characteristics and produces knowledge by solving problems reflectively or prudently. Also, by using mobile technology and artificial intelligence, as suggested by [Miao et al. \(2021\)](#), one acts maturely, resulting from individual autonomy. Consequently, the research develops maturity and individual autonomy by cultivating critical skills, fostering self-discipline, and promoting knowledge acquisition. In this way, humans can address complex challenges, such as uncertainty, where decisions must be made, even without complete information.

### 2.2 Ethical implications of scientific research

Ethics has a clear relationship with actions that directly affect humans and the environment. It encompasses the rigour applied to science, research, laboratories, and universities. Likewise, the ethical implications of the researcher influence the positive or negative aspects of scientific advancement, meaning understanding the harm or benefit a discovery or advancement brings to society and nature. According to [Casanova \(2019: 199\)](#), this process involves “philosophical reflection about the forms of human behaviour”, observing our actions reflectively to determine whether they are right or wrong to improve research or social contribution processes.

Thus, according to [Cisneros and Olave \(2019\)](#), researchers must conduct precise and transparent research without plagiarism or false data. Some ethical considerations include the right to participate or not in research, consideration of intellectual property, or granting credit to other researchers. Additionally, it is pertinent to inform about the research’s implications, objectives, results, or risks. It is also appropriate to guarantee the identity or anonymity of research participants, promote respect for life on the planet, promote the truthfulness of generated knowledge, and comply with current laws, among other aspects of healthy coexistence.

Furthermore, research with ethics in higher education demands a scientific practice based on ethical principles that ensure the advancement of knowledge, understanding, and improvement of the human condition. According to [Santana and Valera \(2022: 193\)](#), “The university must reflect and provide tools for the research conducted in its facilities to meet the highest ethical standards”. Hence, there is the presence of ethics committees whose fundamental role is

to accompany, train, or guide researchers according to current regulations by the university scientific community. Ethics contributes to the credibility of research, generates trust in the results, and guarantees the validity and integrity of the research.

In line with this, promoting ethics in research in higher education is of great value for the common good as it guarantees the integrity and credibility of the scientific process, according to Carreño (2020). Integrating it with ICT, artificial intelligence, good physical and computer infrastructure, collegiate structures, institutional regulations, and financing is also necessary. The university as a system brings together the previous ideas of its community, teaching pedagogies, institutional guidelines, government participation, and aspects arising from the environment. These can generate an optimal product for society if directed towards good. Therefore, a joint effort is essential to achieve this alliance and ensure the university's permanence.

### **2.3 Fusion of ethics, mobile learning, and artificial intelligence through Kohlberg's Moral Development Theory (1970)**

Values in society are of fundamental importance because they represent the positive ethical principles present in groups and individuals, which help them think reflectively. According to Escobar (2021), values give meaning, direction, or guidance to human reason; they help us think before socially acting without succumbing to the anti-values that would lead to society's destruction. Consequently, these attitudes, which reflect human beings' personalities, feelings, and thoughts when interacting with their environment, can be improved for the common good. Hence, it is essential to encourage values in people in 21st-century society to optimise human life without giving ground to those who do not desire good ethics.

In this regard, Kohlberg's Moral Development Theory (1970) emphasises the development of moral judgment as a universal phenomenon that can be free from cultural reality. This is important in educational processes to indicate the correct path to the educational community when making any decision, especially in research processes, where order, honesty, and the accreditation of ideas must prevail. Mobile technology and artificial intelligence are ethically relevant in education because they help facilitate a fair, equitable, and respectful relationship between teacher and student.

In this order of ideas, since education aims to educate society for the future (UNESCO, 2020), it is essential to highlight the need for lifelong learning through research processes with ethics, reinforced by advances in science and technology, ensuring the university's validity, permanence, and transcendence. Therefore, according to Gamboa et al. (2023), a comprehensive human being must be trained for a dynamic world experiencing rapid changes, where continuous, active, and ethical education becomes essential to adapt to a technologically evolving society and its significant social demands.

### **2.4 Viability of research routes: quantitative, qualitative, and mixed**

Research in higher education institutions contributes to advancing knowledge and developing research skills in students, allowing individuals to discern between positive and negative when making decisions in the workplace or personal life. It is recognised that students have unfounded beliefs about research, about how difficult it is to carry out this activity in higher education, let alone choose an approach for their research. In this regard, it is essential to consider the context, situation, resources, objectives, and the problem to be studied. A paradigmatic position must be chosen on what to investigate and what should be linked with science, technology, and ethics.

In this sense, quantitative research, according to Villanueva (2022), is characterised by explaining reality based on the interaction of variables that integrate the phenomenon under study. The researcher should not interfere with the object of study but only describe it. Assumptions must approach reality, navigating through a structure with determined steps to demonstrate, from general to particular, hypotheses with the deductive method. This will allow formulating and demonstrating theories and identifying universal or causal laws. Statistics and mathematics are also used to quantify research data on the problem.

On the other hand, qualitative research, according to Maxwell (2019: 15), refers to its "orientation towards the world in its inductive approach, focused on situations or people". In addition to its subjectivity and data interpretation, it allows contextualising and situating knowledge from both the researcher's and participants' points of view. This helps form personal beliefs and reconstruct reality holistically. Logic and inductive reasoning predominate, moving from particular to general. It is characterised by moving between experience, action, and results

on the one hand and the development of theories immersed in flexibility on the other.

In this aspect, researching, according to [Vasilachis \(2019\)](#), represents not only the confrontation of what is exposed by various authors but also the researcher's participation in verifying possible theories generated by these previous analyses, opening up the depth of the research process in the transformative action of the world with proposals, models, plans, guidelines, and projective foundations of analytical knowledge connotation, thus feeding the integral progress of man.

Consequently, with the evolution of time, the mixed route in research was accepted, which, according to [Cueva et al. \(2023\)](#), requires considering both objective aspects and the experiences and viewpoints of participants. This method offers the possibility of obtaining a total perspective of the phenomenon, providing solid support for decision-making and meaningful knowledge. In this sense, using both simultaneous approaches implies that the differences of one are covered by the other, achieving balance in research using numerical and narrative data. Moreover, this hybrid approach in research allows deepening or expanding emerging knowledge, and preliminary theories can be visualised as deductions or generalisations.

In conclusion, any routes or methods to be used in research depend on the researcher, the topic, and the goals to be achieved. Choosing a research approach ensures that the results are solid, relevant, ethical, reliable, and valid. Moreover, selecting any approach helps optimise resources and significantly contributes knowledge in specific areas. Any approach selected by a researcher is viable. Most importantly, through research, one can contribute to professions by forming a comprehensive individual. With the development of individual autonomy, this individual will make responsible decisions for the common good based on the knowledge acquired through research and experience.

## 2.5 The relationship between education and information and communication technologies (ICT)

21st-century education revolves around individualisation, equality, teamwork collaboration, effective communication, environment, ethics, research, social responsibility, and technology. These themes aim to equip the population with skills, abilities, and knowledge to succeed in non-existent roles in a dynamic environment. This will foster a more active education in the digital age. According to [Echaiz et al. \(2021\)](#), media and information literacy regarding ICT and Artificial Intelligence (AI) is a priority to inform and empower people. Therefore, research or data search implies that researchers must develop their digital skills and competencies.

In this sense, higher education students would cease to be passive reservoirs of knowledge, transforming into active agents of social change with confidence in handling technology. Through continuous practice, this aims to learn to generate knowledge for personal and professional profiles. Similarly, the teacher would cease to be a content provider, becoming a dynamic and updated educator by handling technology more favourably. Consequently, according to [Moreno et al. \(2021\)](#), applying active methodologies with technology in education aids in meaningful learning. Providing learning opportunities where students discover knowledge through teacher experience.

In agreement, according to [Galvis and Duarte \(2020\)](#), it is necessary to highlight that technology is a transformative agent in teaching and learning, providing opportunities for more accessible, personalised, and interactive education. However, as technology advances, as [Habid \(2020\)](#) expressed, education, teachers, and technological structures must also be updated by this community because the future of society depends not on the number of university graduates but on the quality of education. Therefore, as long as technologies evolve and are used ethically, education will break barriers and democratise knowledge.

## 2.6 Mobile technology as a support platform for higher education

Current society demands new educational paradigms such as ubiquitous (u-learning) and mobile learning (m-learning), which will be oriented by the teacher with collaboration, reflection, and interaction. Memorisation learning is abandoned, and feedback in virtual environments with high mobility and integration is proposed. Ubiquitous and mobile learning, according to [Vásquez and Sevillano \(2023\)](#), is a paradigm where students position themselves from a global perspective to access content and use it to learn.

In continuity, according to [Galván \(2023\)](#), m-learning is the efficient development of learning at any time or place through mobile devices (smartphones or tablets). It is a robust part to

facilitate easy and flexible learning. U-learning is accessed from any device with internet access (computers, mobile devices, or Smart TVs). Therefore, information can be accessed from anywhere or anytime, integrating it into the individual's environment without being in the traditional classroom; the difference is the device used to access the content to study.

In this sense, as [Hervás et al. \(2019\)](#) expressed, higher education must advance in teaching processes in multiple accessible formats from anywhere and anytime, enriching teaching and learning—all through continuous, interconnected learning with collaborative work and allowing more effective continuous feedback. Thus, creativity can be promoted using previous knowledge and autonomous, constructivist, and reflective learning in digital environments. Enabling immersive experiences with interactive, engaging, participatory, more significant understanding learning.

Therefore, the advantages of m-learning in education, according to [Gómez and De Pablos \(2023\)](#), are connectivity all the time, mobility anywhere, interaction in both directions, access to speech and listening, and highly creative educational applications. This optimally uses mobile learning in the educational sector by providing quality content and creating content using a phone or tablet. It also allows them to interact with their peers and instructors in real time, learning at their own pace and need.

In agreement, universities must provide access to resources to facilitate collaboration, support practical research, offer tools for organisation, and develop personalised learning continuously and anywhere. As contemplated by [UNESCO \(2023\)](#) in the Digital Learning Week, whose main objective is to disseminate how mobile technologies contribute to improving teaching and learning, adapting the educational sector to 21st-century advances. Likewise, it aims to reinforce the correct use and access to these technologies and promote reading and literacy. Thus, there is an effective integration of technology to improve the quality of higher education by preparing students for the digital age.

Similarly, mobile learning has evolved with technological advances and demands more flexible and personalised learning solutions. Therefore, the future of mobile learning is auspicious, especially in education, where the ways of learning and teaching are being transformed. According to [Santos \(2023\)](#), some significant changes are anticipated in mobile learning, such as artificial intelligence, virtual and augmented reality, gamification of learning, micro-learning, and data-driven learning, which will help personalise the educational experience with interaction and immersion. In this sense, it is advisable to encourage the training of future users of this technique in universities.

## 2.7 Application of artificial intelligence in scientific research in higher education

In the UNESCO declaration (2019) on 21st-century education: vision and action, the efforts in teaching, research, and outreach are reinforced as the institutional mission of the university. Likewise, Article 5, “Promotion of Knowledge through Research”, states that institutions must ensure that all academic community members engaged in research receive adequate training, resources, and support. In order to achieve our mission, we must provide the necessary tools to our university community. If we fail to invest in cutting-edge technology to improve the quality of education, it will result in falling behind and losing social prominence. Therefore, we must take action to stay ahead of the curve.

This leads to considering strategies and resources that allow teachers to develop creativity and critical thinking in the classroom to structure students' coherent thinking, considering previous experiences and new knowledge. According to [Echaiz et al. \(2021\)](#), this achieves innovation and success in the nation by integrating professionals capable of facing the challenges of their environment into society. Thus, this contributes to solving social problems for the development of each nation within the global dynamic.

In this sense, the university community has one of the cutting-edge technologies at its disposal, such as using artificial intelligence in scientific research. Also, according to [Valbuena \(2021: 30\)](#), artificial intelligence is recognised as a subdiscipline of computer science and cognitive neuroscience that studies “the possibilities of creating thinking machines based on biomathematical models that can perform the same tasks as humans”. Machines that perceive, reason, or act like humans provide more advanced tools and efficient methods.

Furthermore, the integration of ChatGPT in scientific research in higher education is of significant importance because it offers a significant advantage by expanding the capabilities of information processing and analysis. As [Ibarra \(2023: 12\)](#) expressed, this artificial intelligence



“has multiple applications in communication at both a personal and professional level”. Thus, using this advanced language model, researchers can quickly and efficiently access or review vast scientific literature, facilitating the review of relevant studies for their areas of interest. Additionally, this technology can generate research ideas or questions, identifying potential knowledge gaps.

Moreover, ChatGPT can suggest additional resources, providing researchers access to various sources and information. It also aids in report writing by structuring, improving coherence, and achieving clarity of content. Furthermore, it offers methodological advice by reviewing writing, streamlining processes, and improving the quality of research in higher education. Additionally, as [Uygun \(2024\)](#) states, as AI revolutionises the teaching and learning process, it is essential to understand educators’ perspectives because research conducted in higher education institutions can directly impact a country’s economic or social development.

## 2.8 Relationship between connectivism, mobile learning, and artificial intelligence in the educational process

In this research, it is paramount to highlight the principles of the connectivism-based model according to [Siemens \(2004\)](#), a learning theory based on the construction of connections as learning activities based on eight principles. Knowledge is distributed through “learning networks, which is achieved through connections and interconnections that occur by interacting in networks, resources, and digital tools available on the internet”, according to [Chunga \(2023\)](#) describes learning in the digital age, where humans recognise their voice, interact in virtual classrooms synchronously or asynchronously, and are protagonists of their learning. Thus, new experiences are described, fostering networked self-learning among teachers and students.

According to [Siemens \(2004\)](#), among the eight principles of connectivism, the first principle states that learning and knowledge require diverse opinions for broad understanding, thus allowing the selection of the best approach. This manifests the relationship between learning and knowing through strategies such as brainstorming, where previous knowledge is exchanged to interconnect it with new knowledge, thus producing learning. Ethics are also observed in respecting others’ ideas and collaborative work and sharing experiences, knowledge, or technological resources. This allows the socialisation of investigative knowledge by forming functional information patterns for critical, reflective, and independent networked learning without the need to know everything, only to know the indicated node.

In this sense, the second principle states that learning is a formation process through a network connected by specialised nodes or sources of information. In this case, the teacher must design teaching strategies to facilitate meaningful learning in students by relating new knowledge to previous knowledge. This allows connections between knowledge. Likewise, the student understands what is studied with the help of mobile technology and artificial intelligence, which are technologies of the historical moment. This allows innovation in learning, enabling more multilinked interactive learning.

The third principle refers to knowledge that can be found in non-human devices, and learning is activated or facilitated by technology. Students or teachers learn from what technology provides them. Machines simplify data processing by summarising and highlighting information based on the researcher’s needs. Teachers encourage students to use technology in a way consistent with their learning process to gain knowledge that can be shared with others. Learning can also come from the environment or organisation, so individuals must be receptive to changes in information and be open to interconnectivity.

The fourth principle states that the ability to know more is as important as what is currently known. That is, the situation of continuing to encourage students to review readings, analyse, synthesise, and reflect on what they have read is raised. So, the student is not a passive agent of the educational fact but participates in constructing their knowledge through social interaction or technology. Thus, they develop their research skills and knowledge appropriation. Ethical research is needed through mobile technology and artificial intelligence to achieve this. Avoid distractions with web pages unrelated to the research topic, copy and paste without analysis, and avoid laziness to produce efficiently in a team.

Following this line of thought, the fifth principle suggests feeding and maintaining connections is necessary for continuous learning. Therefore, the teacher must seek methodological strategies that allow knowledge to nourish the mental structures of their students, who present ideas through oral and written productions that must be evaluated to determine the diversity they have to complement everyone’s learning with interactivity and openness, fostering autonomy.

In this sense, a relationship with the environment, groups, networks, and technology must be maintained to be organised and connected with knowledge. Research and immersion in knowledge networks must also be promoted, thus validating learning.

Likewise, the sixth principle, the ability to identify connections between areas, ideas, and concepts, is essential, as there is a great variety of knowledge and ideas on the internet, environment, and organisations. In this sense, through the assignment of previous activities, the higher education teacher seeks the student's selective research of relevant ideas for specific topics, using mobile technology and artificial intelligence as tools, but ethically, because they must select ideas acknowledging their creators. This way, content is selected online in an organised manner to maintain a connection with the world because everything depends on how well-connected you are with others, your ability to connect, technological literacy, and interdisciplinarity.

In line with this, the seventh principle, decision-making, is a learning process. Because the student must make personal and work-related decisions assertively, it is suggested that by doing this, they have learned knowledge that allows them to act in society according to social requirements. Therefore, the integral formation of the individual through constant research, supported by ethics and technology, is essential. This results in autonomous learning, allowing group interaction in formal and virtual environments and using mobile technology and artificial intelligence to shape their mental structure with others. Thus, the thinking, deliberative, reflective, and creative being is generated, which takes control of learning.

Consequently, the last principle is related to selecting what to learn, and the meaning of incoming information is seen through the lens of a changing reality. This leads us to think that students, to form themselves integrally, must select the most relevant ideas when researching to form their learning because they must be able to defend their points of view with valid arguments as a more experienced teacher will evaluate them to guide their learning. This influences interconnection, allowing us to learn more by selecting important or unimportant knowledge. By researching coherently in interactive, uncertain, and interconnected environments, there is a tendency towards adaptive learning and consulting experts when in doubt.

It is also recognised that students must carry out different connection options to succeed in the personal and work world. According to Ruiz and Barcenas (2019), it is paramount to have integral training to be interconnected and learn new skills with different technology tools. Additionally, according to Menna (2020), individuals must continue researching ethically to solve problems assertively and thrive in this digital age by maintaining the control provided by rapid and timely updates in this changing world for decision-making that benefits humanity.

## 2.9 Significant, social, and constructivist learning in the university system

According to Ausubel (1976), significant learning involves the process by which new knowledge or information is related to the learner's cognitive structure in a non-arbitrary and substantive manner. In other words, learning is significant when it can be incorporated into a subject's knowledge structures. This indicates that students learn when new knowledge aligns with their prior knowledge. Therefore, teachers should focus on researching updated content, planning strategies suitable for the historical moment, and using cutting-edge technological resources in their classes to achieve this connection, where students learn significantly to improve the quality of higher education.

In this sense, Bandura (1974), when proposing social learning, states that humans learn through social interaction and cognition. That is, humans learn by modelling the behaviours of others, not as robots but as thinking beings; in some cases, they can observe, imitate, and reflect and introduce changes in attitudes. Therefore, it is a priority for teachers to model values and ethical principles through the different content imparted in higher education, primarily through research activities to develop ethical professional knowledge and performance, especially with the help of mobile technology and artificial intelligence to shape an integral individual.

In line with this, a 21st-century teacher trained in research will promote constructivist learning, according to Vygotsky (1978), through research processes consistent with reality among their students to learn with others, combining the external with the internal to build new learning guided by experts. For this reason, the teacher encourages student participation, fosters collaborative work, develops decision-making skills, and allows protagonism to promote being, doing, knowing more, and living together in educational centres with a projection to the family and the community. In this sense, the teacher can help foster high-quality educational acts and events framed in technology in higher education.

In this line of thought, comparing the university to a system would be, according to Bertalanffy (2006: 25), “a set of interdependent elements, where the whole is not equal to the sum of its parts, but also includes interaction relationships within the parts”. In the university dynamic, everything involves preparing a product in any area. Thus, visualising the elements of a system in a university, there are inputs or inputs to transform students, teachers, curricula, equipment, and facilities. Outputs or products include books, articles, theses, and graduates. The process involves the financial and administrative management relationships that generate inputs or products.

On the other hand, the University, as an open system, receives feedback from the environment, which allows for improving the process by optimising products. The environment or environment can also be seen as the place where inputs come from to transform for the permanence or validity of the university. The environment has evaluation standards plus supervision of products, which are subject to scientific and technological advances in culture. Consequently, the information that returns to the system serves to improve it, transform it, maintain it, or eliminate it, according to Falcon (2020), showing a correlation between its theory and practice. The university as a system must be dynamic, innovative, and even transformative for its validity and transcendence.

## 2.10 Integral formation of higher education students through research, ethics, and technology

Contemporary society demands professionals with integral training to solve its problems assertively. Barragán (2020: 15) states that integral training in higher education involves “developing professional competencies and guiding attitudes associated with life in society”. That is, developing skills and abilities for the work field and harmonious life from knowing, doing, living together, and continuing to be socially transcendent.

In this line of thought, tutoring is a tool of the university to promote academic excellence, integral training, and careful attention to students, especially in scientific research projects. Martínez (2021: 10) expressed, “Every educator has before them the possibility, and as far as possible, to improve the circumstances of the student”. Therefore, the university should promote tutoring with specialised personnel to guide the individual’s integral formation towards the future. In line with this, the teacher assigned to this activity, according to Expósito and González (2020), will be a teacher with a model of optimal student performance. They must be guided by solid ethical, academic, and technological training that facilitates student self-control and prepares them to develop their life project, avoiding failure and its consequent psychological damage from not finding employment, economic stability, or recognition. The idea is to prevent and eliminate these circumstances around students by improving their self-esteem and encouraging success for the common good.

Likewise, the university should promote continuous improvement processes through educational research as a powerful tool for transforming the different realities present in society. Also, knowledge of research in the university educational community must be updated to work in multidisciplinary teams to innovate from the classroom to the community. This would be through reflexive research that produces knowledge to transform society through assertive decision-making positively. According to Esquivel and Navarro (2020), an integral professional will be created with competencies and skills for social innovation and a solid academic, ethical, and technological background.

According to Urbano and Yuni (2020), research methodology allows for an understanding of the methods by which science obtains the evidence that supports its claims of knowledge and its scope and limitations in the real world. Therefore, a qualitative methodology was used in the developed article. According to Cueva et al. (2023), this approach focuses on profoundly understanding social or individual phenomena from the participants’ perspective.

Furthermore, the interpretive phenomenological approach was employed, which, according to Cuadrado et al. (2021), focuses on the description and comparison of the particular aspects of the subject rather than generalisations, accepting that reality is dynamic, multiple, and holistic. It is oriented towards realities addressed from the context of transformation to describe the coinciding information among the study participants regarding guidelines for integral formation through research with ethics associated with information and communication technology and artificial intelligence.

In line with this, the technique of documentary review was used, where the analysed documents were supported, according to Reyes (2022), by bibliographic sources, digital journals, doctoral theses, and portals on the web, which were collected, discussed, analysed, and syn-



thesised by the researchers. According to [Galeano \(2021\)](#), theoretical participation cannot be dissociated from discussion groups, from theories based on theoretical participation, in social references of transformed action to adapt to the educational reality of the researcher's perception and the actors' study based on the analysed contents.

Similarly, representative categorisation tables were developed for emerging categories ([Galeano, 2021](#)), and triangulation was performed for validity and reliability ([Borjas, 2020](#)). These explain the study's results to practically demonstrate the described purpose, allowing the knowledge of the relevant procedures in recovering and interpreting scientific and social data to expand.

A questionnaire was designed for data collection, a rigorously standardised instrument that translates and executes specific problems ([Solis, 2019, p. 66](#)). It consists of 10 open-ended questions to be answered by the 38 teachers based on the emerging categories provided by the selected authors. The questionnaire is as follows:

### 2.11 Questionnaire for teachers

- Do you apply the development of thinking processes with students?
- Do you promote ethics in research?
- Do you encourage recognition of content produced by other authors in research?
- Why do students find it challenging to establish a paradigmatic position in research?
- Do you provide content with ICTs?
- Do you use mobile technology in content development?
- Do you integrate artificial intelligence into scientific research?
- Is there a promotion of connectivity as a tool for active learning?
- Do you plan content that intertwines with prior learning to achieve meaningful learning?
- Do you encourage the integral development of students for the common good?

Twelve research experts confirmed the instrument's validity based on content validity guided by [Castellano \(2020: 15\)](#), which determines whether the researcher's designed items personify the behavioural universe or theme it aspires to measure in the best possible way. [Solis \(2019: 27\)](#) also states that "the questionnaire is valid if it aligns with reality", which the researcher observes without data distortion.

## 3 Results

The results of the study demonstrate the research contribution of the documentary review described in the methodology of the study by the different authors analysed as the basis for the emerging categories ([Galeano, 2021](#)), which guide the research product of the analysis that characterised the referential development of the group research according to [Iglesias \(2023\)](#), providing the evident nature of the considerations presented in [Table 1](#), in order to generate guidelines for integral formation through research with ethics, associated with information and communication technology (ICT), and artificial intelligence, with the explanatory appropriation of the various benefits of divergent and convergent knowledge.

## 4 Discussion

In light of the above results, the guidelines for integral formation through research with ethics associated with information and communication technology (ICT) and artificial intelligence are considered beneficial. This would help improve the relationship between teachers and students in the educational process. It is favourable for developing an educational process characterised by respect for institutional norms, socialisation, research with ethics, integration with mobile technology, timely use of artificial intelligence, and integral formation. These elements guide real, meaningful learning, enhance the quality of higher education, and enable the solution of social problems with assertiveness and responsibility.

### 4.1 Triangulation

Data triangulation, as described by [Cueva et al. \(2023\)](#), involves comparing and contrasting different sources and types of data to increase the reliability and validity of findings. Additionally, as [Domínguez and Medina \(2019\)](#) stated, it enables the understanding and solving of relevant problems. Therefore, [Table 2](#) illustrates the triangulation of results after considering the opinions of university professors in response to questions related to emerging categories, with the researchers' references contributing to the guidelines proposal.

**Table 1** Relationship between emerging categories, epistemological evidence and emerging issues

Emerging Category	Epistemological Evidence	Emerging Issue
Scientific Research, Knowledge, Individual Maturity, and Autonomy Mar, Barboza y Molar (2020) Rodríguez (2020) Niño y Mendoza (2021) Miao, Holmes y Zhang (2021)	It consists of finding answers to questions through scientific processes and acquiring knowledge, maturity, and individual autonomy as the researcher executes it.	Higher education students often need help engaging in scientific research processes because they perceive them as limited utility, dull, and difficult to comprehend. This hinders the fluidity of knowledge acquisition and personal maturity, stifling productive knowledge exchange.
Ethical implications of scientific research. Casanova (2019) Cisneros y Olave (2019) Santana y Valera (2022) Carreño (2020)	It consists of philosophical reflection on the forms of human behaviour in scientific research in higher education.	Plagiarism, data mishandling, and abuse of study objects sometimes overshadow scientific research at certain universities. These practices diminish the credibility of scientific research and the quality of education.
Theory of Moral Development Escobar (2021) Kohlberg (1970) Unesco (2020) Gamboa, Peña y Trujillo (2023)	It asserts the development of moral judgment as a universal phenomenon, which may be independent of cultural reality, considering this critical for resolving conflicts in the educational and technological spheres.	The copying of material from the internet without proper analysis, synthesis, reflection, and referencing is evident, thus disregarding the copyright rights reserved in research for the original creators. Additionally, using other digital textual resources without engaging the student's mental functions for meaningful learning is also observed.
Viability of research routes: Quantitative, qualitative, and mixed methods. Villanueva (2022) Maxwell (2019) Vasilachis (2019) Cueva, Jara y Arias (2023)	The research routes are quantitative, qualitative, and mixed. All of them are viable.	Students often struggle to establish a paradigmatic position in the research process, leading to low self-esteem, fear of failure, and rejection of the process.
Relationship between Education and Information and Communication Technologies (ICT). Echaiz, Sibal Y Hu (2021) Moreno, Trujillo y Aznar (2021) Galvis y Duart (2020) Habid (2020)	They propose an educational model where teaching will be effective with technology.	Higher education students exhibit passivity when receiving knowledge from teachers who must adequately utilise technology to activate educational processes.
Mobile technology as a platform to support higher education. Hervás, Vásquez y Fernández (2019) Galván (2023) Vásquez y Sevillano (2023) Gómez y De Pablos (2023) Unesco (2023) Santos (2023) Norbutayevich (2023)	Advancement towards teaching processes in multiple formats accessible from anywhere and at any time enriches teaching and learning processes.	Mobile technology is limitedly used in higher education, making this activity passive.
Application of artificial intelligence in scientific research in higher education. Ibarra (2023) Echaiz, Sibal Y Hu (2021) Valbuena (2021) Unesco (2019) Uygun (2024)	Artificial intelligence has multiple applications in communication, both at a personal and professional level.	The vast volume of information on the internet makes immediate analysis difficult for teachers and students.
Relationship between connectivism, mobile learning, and artificial intelligence in education. Siemens (2004) Chunga (2023) Ruiz y Barcenás (2019) Menna (2020)	Interconnected learning networks formed through internet interactions and digital tools facilitate knowledge dissemination.	Teachers and students have limited access to mobile technology and artificial intelligence to establish learning connections in the educational process. This is due to a need for more resources and the development of appropriate strategies for frequent use.
Significant, social, and constructivist learning in the university system. Ausubel (1976), Bandura (1974), Vigotsky (1978), Bertalanffy (2006), Falcon (2020)	They suggest that learning is meaningful when it aligns with prior knowledge and occurs through socialising knowledge within a system.	The university system needs to socialise student research and knowledge through technology more. Otherwise, individual development will be limited, and students will have few technological skills and abilities.
Comprehensive formation of higher education students through research, ethics, and technology. Barragán (2020) Martínez (2021) Esquivel y Navarro (2020) Expósito y Navarro (2020)	Comprehensive education in higher education involves developing professional competencies and guiding attitudes associated with life in society.	More modernisation of teaching strategies in higher education framed within mobile technology and artificial intelligence is needed for ethical research and comprehensive education.

**Source:** Own elaboration (2024)

It is essential to highlight that university students have the opportunity to establish a paradigmatic position when researching to shape their knowledge. This involves decision-making and applying critical, reflective, analytical, and synthetic thinking processes, thereby acquiring knowledge and skills that contribute to positive competencies in 21st-century society. In this era, evaluating situations objectively and letting go of fears, myths, and false beliefs is necessary to achieve success. The following guidelines are specified in [Table 3](#).

It is pertinent to disseminate the study results after a direct reflection on procedural validity, as per [Vasilachis \(2019\)](#). Higher education must be multidisciplinary, starting from the comprehensive formation of the human being. This implies that ethical research associated with information and communication technology (ICT) and artificial intelligence is about effectively utilising the technological tools of society in the educational process.

**Table 2** Triangulation of collected information among authors, involved stakeholders and researchers

Emerging Category	Authors	Stakeholders Involved (University Faculty)	Researchers
Scientific Research, Knowledge, Individual Maturity, and Autonomy	Mar, Barboza y Molar (2020) Rodríguez (2020) Niño y Mendoza (2021) Miao, Holmes y Zhang (2021) The analysis, comparison, synthesis, evaluation, and reflection to generate knowledge, maturity, and autonomy should be carried out in the fluid exchange between participants and the teacher as a specialist.	Most mention applying some of these in the research they assign as tasks, but more needs to be described of student development due to the lack of direct audio-video interaction with them.	Video conferencing is being undermined in favour of using various active strategies with the participant, such as the question strategy and interaction with the teacher on various topics.
Ethical implications of scientific research.	Casanova (2019) Cisneros y Olave (2019) Santana y Valera (2022) Carreño (2020) Scientific research in some universities is sometimes overshadowed by plagiarism.	They believe meaningful learning will be promoted depending on how research is utilised, as long as the student analyses it instead of simply copying and pasting it.	Assigning complex topics related to artificial intelligence for students to investigate, encouraging analytical execution, and drawing cognitive conclusions with more remarkable synthesis and reflection.
Theory of Moral Development	Escobar (2021) Kohlberg (1970) Unesco (2020) Gamboa, Peña y Trujillo (2023) There is evidence of copying material from the internet without proper analysis, synthesis, reflection, and referencing, thus disregarding copyright rights.	Implementing plagiarism detection programs to determine the performance and usage of participants regarding the content they extract from artificial intelligence.	Discipline procedures regarding plagiarism, systems for protecting intellectual production, and promoting the use of citations to enhance interpretation need to be more widely disseminated.
Viability of research routes: Quantitative, qualitative, and mixed methods.	Villanueva (2022) Maxwel (2019) Vasilachis (2019) Cueva, Jara y Arias (2023) Students often struggle to establish a paradigmatic position in the research process.	The tools are used without deep interaction with teachers and tutors.	Interaction with online tutors who can implement strategies for developing thinking skills in participants during the activities they carry out needs to be maintained more frequently.
Relationship between Education and Information and Communication Technologies (ICT).	Echaiz, Sibal Y Hu (2021) Moreno, Trujillo y Aznar (2021) Galvis y Duart (2020) Habid (2020) Passivity in receiving knowledge from teachers who need to use technology to activate educational processes properly.	The primary function assigned to technological tools is the assignment of tasks.	Technological strategies, such as audio and videos, that foster interaction between teachers and participants are rarely activated.
L Mobile technology as a platform to support higher education.	Hervás, Vásquez y Fernández (2019) Galván (2023) Vásquez y Sevillano (2023) Gómez y De Pablos (2023) Unesco (2023) Santos (2023) Norbutayevich (2023) Little mobile technology is used in higher education's educational processes, making this activity passive.	Only WhatsApp or calls are used, but it is evident that there needs to be a connection with the relevance of activating the technological platform the university assigns to the teacher.	The adaptation of using the respective platform must be improved, even with mobile technology.
Application of artificial intelligence in scientific research in higher education.	Ibarra (2023) Echaiz, Sibal Y Hu (2021) Valbuena (2021) Unesco (2019) Uygun (2024) The vast volume of information on the internet makes immediate analysis difficult for teachers and students.	Students tend to only produce information based on what is presented on the internet.	There needs to be more connection between the application process of analysis and the application of artificial intelligence.
Relationship between connectivism, mobile learning, and artificial intelligence in education.	Siemens (2004) Chunga (2023) Ruiz y Barcenas (2019) Menna (2020) Knowledge is distributed through learning networks.	Misuse of artificial intelligence, using it as a do-it-all tool.	Individual development is not promoted because of a lack of cohesion in thinking strategies.
Significant, social, and constructivist learning in the university system.	Ausubel (1976), Bandura (1974), Vigotsky (1978), Bertalanffy (2006) y Falcon (2020) Theories of learning and learning content.	Significant learning does not occur when it does not align with prior knowledge.	Knowledge production is inhibited by only validating what is achieved as completed, without probative relation to work experience or previous knowledge.
Comprehensive formation of higher education students through research, ethics, and technology.	Barragán (2020) Martínez (2021) Esquivel y Navarro (2020) Expósito y Navarro (2020) Development of professional competencies with attitudes	Disconnection between the competencies for which university education prepares and what is achieved in the workplace	Limited use of technologies to expand one's knowledge.

Source: Own elaboration (2024)

Furthermore, it is essential to recognise the use of thinking processes, recognising individuals as thinking beings with diverse experiences and actions. According to Kohlberg's theory of moral development (1970), moral judgment development is a universal phenomenon linked to individual behaviour based on internalised values, properly using available resources. On the other hand, analysing the data provided by the studied authors reveals that the authors identified

**Table 3** Guidelines for comprehensive training through research with ethics in areas associated with information technology, communication and artificial intelligence

Emerging Category	Guidelines
Scientific Research, Knowledge, Individual Maturity, and Autonomy Mar, Barboza y Molar (2020) Rodríguez (2020) Niño y Mendoza (2021) Miao, Holmes y Zhang (2021)	Promoting the application of thinking processes in research, such as analysis, comparison, synthesis, evaluation, and reflection, to generate knowledge, maturity, and autonomy.
Ethical implications of scientific research. Casanova (2019) Cisneros y Olave (2019) Santana y Valera (2022) Carreño (2020)	According to the researcher's perceptions, the application of reliable plagiarism detection programs with international licenses and correction features.
Theory of Moral Development Escobar (2021) Kohlberg (1970) Unesco (2020) Gamboa, Peña y Trujillo (2023)	Establishing the correct use of mobile technology and artificial intelligence for meaningful learning in higher education to improve educational quality. Implementing legal regulations in cases of proven plagiarism in intellectual production.
Viability of research routes: Quantitative, qualitative, and mixed methods. Villanueva (2022) Maxwel (2019) Vasilachis (2019) Cueva, Jara y Arias (2023)	Assigning university tutors for intellectual production processes to help students succeed, using technology in socialisation processes to develop communication skills and values by core and potential research lines.
Relationship between Education and Information and Communication Technologies (ICT). Echaiz, Sibal Y Hu (2021) Moreno, Trujillo y Aznar (2021) Galvis y Duart (2020) Habid (2020)	Increasing the likelihood of using artificial intelligence and mobile technology in knowledge socialisation in education.
Mobile technology as a platform to support higher education. Hervás, Vásquez y Fernández (2019) Galván (2023) Vásquez y Sevillano (2023) Gómez y De Pablos (2023) Unesco (2023) Santos (2023) Norbutayevich (2023)	Incorporating mobile technology ethically into educational practice to optimise educational processes through active knowledge socialisation, thereby generating meaningful learning.
Application of artificial intelligence in scientific research in higher education. Ibarra (2023) Echaiz, Sibal Y Hu (2021) Valbuena (2021) Unesco (2019) Uygun (2024)	Implementation of a continuous, active, and interconnected learning process with collaborative work for effective feedback, framed in the ethical use of artificial intelligence.
Relationship between connectivism, mobile learning, and artificial intelligence in education. Siemens (2004) Chunga (2023) Ruiz y Barcenas (2019) Menna (2020)	Mobile learning and artificial intelligence are strengths in intellectual production, provided that they are adapted to the researcher's analytical thinking and ethical work.
Significant, social, and constructivist learning in the university system. Ausubel (1976), Bandura (1974), Vigotsky (1978), Bertalanffy (2006) y Falcon (2020)	Establishing the use of technology-enhanced education to strengthen meaningful learning processes in both professional and personal settings with community projection.
Comprehensive formation of higher education students through research, ethics, and technology. Barragán (2020) Martínez (2021) Esquivel y Navarro (2020) Expósito y Navarro (2020)	Promoting ethical research in higher education to acquire knowledge, skills, abilities, and values within mobile technology and artificial intelligence towards the individual's completeness, success, and common good.

Source: Own elaboration (2024)

in the emergent categories converge on opening up innovative educational processes in higher education, linking them to individual analysis to provide significant use in the student's learning process. Additionally, this innovation as an effective tool must be learned to be used consciously in both professional and personal realms without dissociating from ethics, adapting it to the cognitive interpretation of what is being done and to the present reality.

Finally, after describing in Table 1 the relationship between emergent categories, epistemological evidence, and emerging problems, researchers extract from the divergences among the authors the guidelines for comprehensive training through ethical research associated with information and communication technology and artificial intelligence, as depicted in Table 2. This provides evidence of the need to foster ethical research in higher education to acquire knowledge, skills, abilities, and values within information and communication technology and artificial intelligence.

## 5 Conclusion

In conclusion, the researcher must carry out their work with care, respect, and humanity, grounding their knowledge in ethical principles and values that guide them toward scientific rigour. This will facilitate overcoming weaknesses and threats, which can lead to scientific deviations inherent to human nature. These challenges must be overcome through the socialisation of the nature of the study, epistemological foundations, methods, and techniques employed, recognising scientific research as a process of critical reflection aimed at innovating with knowledge.

Higher education must leverage scientific and technological advances for its transcendence through quality research framed in ethics and community collaboration. This will contribute to

social development and the university's sustainability, as scientific research influences society, promoting general well-being and providing informed decisions for sustainability.

Knowledge from university scientific research must be precise, relevant, verifiable, clear, and structured. This requires a harmonious relationship between the university, the nation, the researcher, ethics committees, science, and technology. The researcher must strive to communicate and transfer their knowledge effectively within the ethical principles of society. At the same time, university faculty must guide educational processes with the innovation provided by their experience and knowledge of the evolving environment.

The researcher needs to focus on accurate and relevant societal problems, engage with the community, seek interdisciplinary assistance, and work on practical solutions. Additionally, they should participate in education campaigns, dissemination, and communication of research results to socialise knowledge and contribute to social well-being locally and globally.

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