

CHALLENGES OF RESEARCH IN THE 21ST CENTURY

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ABSTRACT

Research is a process that encompasses many variables and constitutes a fundamental pillar for education and progress, since it promotes human development from all its dimensions, developing multiple skills and abilities. Research in the 21st century faces many challenges, but without a doubt, one of the most relevant is to get individuals interested and become actors in a continuous research process, where it is possible to articulate different scenarios closely related to development. human as son; school, university, state and society. Without a doubt, there is a wide difference between the investigative culture of the great world powers and the Latin American and Caribbean region; Based on this reality, this essay attempts to analyze some of the clearly identified causes, mainly in Colombia, by researchers, state entities, and from the personal pedagogical practice of its authors and; It raises some of the needs and opportunities that are glimpsed from the establishment of public policies, the proposal of a budget adjusted to the needs and its guarantees of compliance.

Keywords: Innovation, development, collaboration, inclusion, education.

INTRODUCTION

"In the light of research, many shadows grow"... Even today, in the midst of a globalized world, where technology opens the doors to information and offers great accessibility to knowledge,

research is for many something unattainable, an exercise destined only to intellectuals or the scientific community; however, it can be said that for some time, important efforts have been made to transform this paradigm, from school, university and other educational scenarios; advances that are significant to bring us closer to research.

But on what does it depend to advance towards the purpose of achieving the adoption and appropriation of a research culture? What factors determine what can favor or what can represent an obstacle for it? What would be the challenges of research in the XXI century?

In order to try to answer these questions, it is proposed to approach it from three different scenarios, but in essence, intrinsically united by a common characteristic such as human development; these scenarios are: the school, the university and, finally, the labor or professional field, making an analysis from the common problems, obstacles, achievements and opportunities for improvement.

CHALLENGES OF RESEARCH IN THE 21ST CENTURY

When talking about research, several questions arise, this is given from the academic level of those who intend to investigate; in order to promote a research culture, it is important to clarify what this process encompasses.

For Pérez, Mariana. The concept of research can be defined as that methodical, systematized, objective and orderly process, which aims to answer certain questions, theories, assumptions, conjectures and/or hypotheses that arise at a given time on a given topic, research also allows the acquisition of knowledge and information on a topic or subject that is unknown. (2021, p.1)

Pérez, states that *“research is an orderly action aimed at obtaining or acquiring, by means of observation and experimentation, new knowledge about different fields of technology and science”*. (2021, p.2)

It is worth mentioning that research appears when there are questions about events or circumstances that become relevant, hence its transcendence in the life of the human being; through it, problems are solved, contributions are made towards improving the quality of life of people or alternative solutions are established to situations that threaten or endanger the survival of humanity.

The COVID-19 pandemic is a clear example of one of them, since it highlighted the deficiencies and weaknesses existing in the poorest countries, where the technological and scientific backwardness is directly proportional to the deficient response capacity to face emerging situations that put the life and health of their individuals at risk and the wide margin of difference that is present in those territories where the investment of resources in education, science and technology is prioritized.

Ideal research scenario: Articulation of school-university, business, state and society.

Research constitutes a fundamental pillar of education and for this reason, it promotes human development from all its dimensions; cognitive, technological, scientific, social and cultural; since it allows the development of thinking, communication, interrelation, criticality and autonomy skills, among others.

In Colombia, the National Science, Technology and Innovation System (SNCTI) “*aims to integrate scientific, technological and innovation activities under a framework where companies, the State, academia and citizens can work together*” (2021). In order to achieve this goal, provisions are established to articulate these components.

For their part, educational centers, as spaces for the development of thought and knowledge, should seek to motivate students towards research, based on the interests and needs that they have from the context in which they are immersed. This task will not depend exclusively on the teacher, but on all members of the educational community and, therefore, should be contemplated from the guidelines established in the curriculum; in this way, the search for interest in science, technology and the development of new contributions, will be a common language and not an isolated exercise under the responsibility of a few.

The scientific journal Nature published an article in which the results of a survey of 12,000 readers of the journal on the challenges of research were made public. The results show that 65% of the scientists surveyed have considered leaving research and 15% have already abandoned it. (Pompeu Fabra University, 2016).

In parallel, to the crisis that research is currently experiencing, the school of the 21st century has its own challenges. The public education sector in Colombia, for example, faces adverse situations that range from the general, occupying a broad spectrum of governmental and political

management such as; the lack of commitment of the rulers towards public education, the lack of basic sanitation in many rural sectors of the population, the diversion of resources allocated to education, to more specific situations of institutional and local management such as; school absenteeism, violence and family breakdown, abandonment, lack of attention and accompaniment, poverty and lack of opportunities, among others; all of the above, constitutes in itself, a great barrier to learning and consequently, comprises one of the great challenges for the progress of education and research.

Zubiria states that *“up to now, education in the country does not fulfill its essential functions. The World Bank estimates that eleven generations are required to overcome poverty in Colombia. If we investigate in depth, there are two reasons that explain this: the low quality of education and the gaps between public and private education that have been increasing in the last thirty years”* (2021, p.1).

In a more specific context and taking a look at the interests of the student population of public schools in Colombia, it is clear that many students lack an idea of a life project, centered on personal improvement and determination to achieve great accomplishments; Many of them set their goals on getting *“easy”* money, living day by day doing activities that involve little effort and that generate a minimum income to subsist; since their interests are not oriented to their education, training and development, unfortunately, from the perspective of some, education is not a priority, much less research, the latter is not even a topic that minimally awakens their interest.

Thus, a revaluation of education is necessary from all its dimensions and from the perspective of all the actors in the educational process; from those in power, taking into account the fact that educational policies cannot be subject to the interests and whims of the government in power, but must be based on the urgent need to raise the level of resources, the educational quality offered, the methodologies, the teaching styles, and that all this, together, must be guaranteed by the state, the educational centers, society and the family; the reactivation of parents' schools becomes, now more than ever, a tool of great value and to give it a greater meaning, the inter-institutional support of social welfare entities becomes indispensable.

In relation to the above, Rincon Martinez (2004) states that:

The educational policies supported by governments in Latin America make it almost impossible for current educational models to address the complex problems of education.

A different vision of intervention, which conceives education as an investment to generate the necessary transformations that guarantee a human development with a high social sense, means a rethinking of the strategies to address these problems. A rethinking that starts precisely from the official educational policies to build an alternative proposal that makes possible the solution of educational problems. (p.2).

It should be added that, as expressed by Delors (1996), it is a fact that education has become a major concern for humanity to progress in the 21st century towards ideals of peace, freedom and justice in nations. Likewise, it has become one of the great problems that must be solved in contemporary societies, which is why it is urgent for researchers to intervene in each and every one of the diverse educational problems in poor nations; it is necessary to train researchers to find ways of intervening in the complex problems that affect the majority of the peoples of Latin America.

The school outside the school

Classroom discourse has changed and so have its practices, as the accelerated advance of technology and science demand an open disposition to reflection, to the deep analysis of ideas and the transformation of these ideas into realities.

John Amos Comenius (1592-1670) was the first to present a 'methodology of education based on the union of pedagogy and didactics. He not only clearly conceived the curriculum as the ordered set of subjects to be worked on and learned, but the use of the book, and even the picture book as the support mechanism in the teaching and learning process (Rama, 2020, p. 4).

More than ever, today it is imperative to implement varied and innovative teaching strategies to facilitate student learning; therefore, the incorporation of digital tools is essential in an educational process that requires modernization of methodologies that promote the development of thinking, autonomy, critical thinking, among other skills.

Today we talk about hybrid education: a new idea of learning construction from the traditional school scenario and the use of remote education through ICTs. This proposal arose from the experience of the compulsory confinement to which the education sector had to submit after the COVID-19 pandemic; it offers an opportunity for growth and development, since it offers more options and strategies from a scenario oriented by the teacher in class and a digital scenario that is worked from home, which in an articulated way enriches the pedagogical practice.

Hybrid education implies the construction of a new education, differentiated forms of management with the use of synchronous, asynchronous, automated and manual forms; more flexible dynamics to meet the growing demand for access and promote the creation of a diversity of learning environments adjusted to the singularities of the various professional, knowledge and social fields (Rama, 2020, p. 117).

On the other hand, applying the methodology of hybrid education implies another challenge that must be rigorously addressed so that training is comprehensive through the appropriate use of technology.

It is a fact that technological progress and with it electronic devices have improved the quality of life and that is an indisputable reality; but this has also brought with it a wide range of distractions that have allowed people, especially children and young people, access to entertainment tools that, far from contributing to the formation of the human being, induce the excessive use of them and result in the minimization of interest in study and research and in the worst cases even ends in the development of addictions.

It is also worth mentioning that the proliferation of social networks and their easy access, the excessive amount of time spent on them and the “*influence*” of so-called “*influencers*” towards some meaningless practices, have created a distorted idea of experimentation. This problem has grown substantially given that many parents are not present; the demands of work take up most of the time and there is little space available to strengthen family relationships and build environments of motivation and interest in study and research.

Proof of this, is the Influencer Marketing Status Report 2019, conducted by Launchmetrics which states that, “*45.5% of industry professionals consider that the so-called micro-influencers or opinion leaders with small volumes of community, turn out to be the most effective in reaching their audience*” (Gulberti, 2019), that is, they induce young people to consumerist trends, to superficial life models and even, to the use of the body as an object of economic production through unbridled sexuality, billing millions annually, leaving an impression that intellectual effort is not necessary to achieve success.

On the other hand, the growing phenomenon that humanity is currently experiencing, in the face of communication through screens and “*interpersonal*” relationships established virtually, has

not only generated physical and socioemotional distancing, but has also given way to a pattern of human behavior associated with indifference.

In this sense,

Darío Greni (2022, as cited in Martínez C. 2022) Rural School teacher *“We have to really ask ourselves if our educational practices are being useful to our students, and if we are educating for the society in which each of them will be active protagonists.”*

From this perspective, a great challenge of research involves: changing the idea that research is boring, awakening the interest of children and young people towards research practices that go according to their age, interests and resources. At the same time, it requires a reevaluation of the means that technology offers for learning, developing critical thinking that allows them to classify the contents to which they have access and prioritize what they wish to learn. This implies that interest in research should start in the family, followed by the strengthening of methodological and strategic processes at school and the appropriation and projection at the university.

In this sense, it would be expected that, based on the learning experiences accumulated at school, an interest in science, research and technology would emerge and be maintained, which would mature and be strengthened at the university; however, as mentioned above, this is a subject that is given due importance at the school stage, since the necessary foundations are not in place for this process to take place to the expected extent. On the contrary, it is only at the university where an initial research training process takes place and this generates a wide disadvantage, in comparison with other countries where research projects are carried out at school. This situation is a relevant challenge for the positioning of research in the training of future professionals.

Parallel to this, there is another obstacle and it has to do with the investment of resources in research; since, while in the public university the resources depend directly on the state and are limited, the research led by the private sector advances in greater proportion, because behind it is the investment by multinationals with specialized laboratories and strengthened with the human material and equipment required for such an important mission.

Also, private sector industry is accountable to its shareholders, who are generally more interested in profits than in the pursuit of knowledge for its own sake. Shareholders are likely to support programs and projects that immediately produce actionable results. As a result, basic

research will lose out.

Will the university have the moral tenacity and resources to strike a balance between its cherished values of research freedom and intellectual honesty? If government- and industry-supported research is pursued, there could be long-term consequences that are difficult to predict. *“The challenge now is to find ways to satisfy the interests of both parties cooperating in research”* (Akyeampong, 1998, p. 8).

RESEARCH IN THE PROCESS OF INCLUSION

According to the World Declaration on Education for All, approved in Jomtien (Thailand) in 1990, a vision is established that calls for the universalization of access to education for all children, youth and adults, accompanied by the promotion of equity. It is therefore necessary to identify the obstacles they face in accessing educational opportunities, and to determine the resources needed to overcome these obstacles.

“Inclusion is understood as the practice of educating all students, including students with disabilities in regular education and in regular classes” (Stainback, 1999).

Inclusive education does not mean placing students with disabilities in regular classrooms without appropriate guidance; much less that all students with disabilities necessarily have to achieve the same educational objectives using the same instructional methods; beyond this, inclusive education implies adjusting the curriculum in a flexible manner that allows guiding those who need it to reach the minimum or basic achievements, skills and competencies that allow them to improve their individual performances in tasks that are designed and established, taking into account the conditions of the individuals involved. This includes linking people with these characteristics to research processes.

Currently, it has been noted that a person with a disability has a sea of possibilities and qualities to explore, thus research plays a fundamental role in the construction of elements that nurture what would be called inclusive flexible curricula. *“For the education system to be inclusive implies that it is not the person who adapts to the school or education, but it is the school and education in general that is designed in a universal way, is made flexible, provides support and reasonable adjustments in a personalized way, to ensure that children with disabilities can access, remain, be promoted, evaluated and generally participate on an equal basis with others”* (Political Constitution of Colombia, Article 11 of Law 1618 of 2013).

Traditionally, the exercise of research involves mostly people wrongly called “*normal or regular*” leaving aside the great contribution that could be found from the participation of people with great talents that although they do not have the same way of communicating or expressing their ideas, they can make great contributions to it, limiting their participation in events and scientific communities, evidencing the lack of a clear and assertive process of inclusion in research.

A FAVORABLE SCENARIO FOR DEVELOPMENT

Colombia is a country rich in biodiversity, with a wide range of flora and fauna species, with geographical limits between two oceans and immense water sources; with fertile lands and great wealth of minerals and hydrocarbons, it could constitute a favorable scenario for sustainable development and consequently become a world potential. But why is this not happening?

Despite the importance of research for human development, Colombia has a low level of research training and scientific production. An overview of this problem shows that these weaknesses are closely related to all of the above; this is how development is subordinated to advances in education, technology and productivity; therefore, if educational quality does not advance, if technological advances are not achieved, if processes are not technified and producers are not qualified, there will be a stagnant economy that does not reach its full potential and that establishes a relationship of dependence on other countries to supply needs that, although they can be satisfied internally, from local economic production, it is more effective to import them.

Colombia needs a communication strategy that can make the population understand that investment in scientific research will result in enormous benefits, both nationally and internationally. To carry out this purpose, it is required that teachers and managers constantly update their knowledge, since it is not about having absolute knowledge, but to understand that the concepts are evolving and changing according to the context, that is why it is essential the qualification and updating of knowledge of all teachers and these in turn are aimed at scientific training from an early age, favoring the learning processes of the student, it is required to design new educational strategies that reconceptualize the training of quality professionals.

Given the dimension of the various problems that underlie education, educational researchers must be trained, which should be designed as an alternative proposal for professionals who, in addition to dealing with educational problems with professionalism, acquire a social and human commitment that allows them to participate

in the formation of the highest universal values (Ramirez Rincon, 2004; Perez, 2021; Zubiría, 2021; Rincón Ramirez, 2004).

Research appears when there are questions about events or situations that become relevant, hence its transcendence in the life of the human being; through it, problems or dangerous situations are solved as far as the survival of humanity is concerned; The COVID-19 pandemic highlighted the deficiencies and weaknesses existing in the poorest countries, where the technological and scientific backwardness is proportional to the deficient response capacity to face emerging situations that put the life and health of their individuals at risk, and the wide margin of difference that is present in those territories where the investment of resources in education, science and technology is prioritized.

RESEARCH IN COLOMBIA

In Colombia, progress in scientific research has been gradual, with progress that, for many, is not very noticeable; since, in comparison with other countries, the gap in this area is still very wide. However, a growing panorama is foreseen in the coming years, from the emergence of new training programs, the emerging boom of virtual education, which provides greater accessibility in terms of time distribution and economy have counteracted, to some extent, the problem of high costs to access specialization programs, master's degrees, doctorates, which opens doors to continuing education and improves the training of professionals.

In this regard, UNESCO states that information technology has proved to be an extremely useful medium for researchers, although its full potential has not yet been fully exploited. Its recent forays into the higher education industry, through the creation of the “*virtual university*”, have led some to predict the demise of the traditional university structure in its current configuration. The reason for this is that the “*virtual university*” has several advantages over the traditional university in that it fosters collaboration between remote universities and faculty, allows students easy access to world-class libraries at different institutions, and is an excellent means of reducing costs (1998).

As for the institutions responsible for the promotion, establishment of policies, guidelines, plans, programs and projects, distribution of resources and other means that facilitate the implementation of research programs, it is believed that progress has been made by making a commitment to innovation. For decades, scientific research in Colombia was under the responsibility of the Colombian Fund for Scientific Research and Special Projects “*Francisco José de Caldas*”,

for greater precision, this period was from 1968 to 1990.

From 1991 onwards, this social responsibility passed into the hands of “*Colciencias*”, the Colombian Institute for the development of science and technology until 2008, an institution that was recognized as the maximum regulating entity of the processes related to science, innovation and technology. During this period, exactly in 1993, the Mission of Science, Education and Development, better known as “*Mission of Wise Men*”, was formed. This resulted in recommendations that were incorporated into the Science and Technology Policy 1994-1998.

The Ministry of Science, Technology and Innovation is created through Law No. 1951 of January 24, 2019 and according to the Constitution and the law, as an agency for the management of public administration, governing the sector and the National Science, Technology and Innovation System (SNCTI), responsible for formulating, guiding, directing, coordinating, executing, implementing and controlling the policy of the State in this area, in accordance with the development plans and programs, according to this Law.

By creating a ministry, a significant advance is registered in the sense that, in some way, this implies a recognition of greater value to science, research and innovation; in addition to being able to exercise greater autonomy in terms of establishing strategies, plans, programs and projects; likewise, it allows greater availability of resources and investments that have an impact on greater financial support for new research.

Below is a comparative table between the purposes established in Law 1286 of 2009 and Law 2162 of 2021, which dictate provisions on public policies for Science, Technology and Innovation in Colombia. The former, functioned as a guideline from 2009 until 2021 when the latter came into force, through the creation of the Ministry of Science, Technology and Innovation:

Comparative table of purposes between Law 1286 of 2009 and Law 2161 of 2021

Law 1286 of 2009	Law 2162 of 2021
<ol style="list-style-type: none"> 1. To increase the country's scientific, technological, innovation and competitiveness capacity in order to add value to products and services of national origin and improve the well-being of the population in all its dimensions. 2. To incorporate scientific research, technological development and innovation into productive processes in order to increase the productivity and competitiveness required by the national productive apparatus. 3. To establish mechanisms to promote the transformation and modernization of the national productive apparatus, stimulating industrial reconversion, based on the creation of companies with a high technological content and giving priority to the national supply of innovation. 4. Integrate the efforts of the various sectors and actors to promote strategic areas of knowledge for the country's development. 	<ol style="list-style-type: none"> 1. To formulate the country's public policy on science, technology and innovation, identifying the interests of the nation in those areas that fall within the competence of this entity. 2. To establish strategies for the advancement of scientific knowledge, sustainable, environmental, social and cultural development, and the transfer and social appropriation of Science, Technology and Innovation, for the consolidation of a knowledge-based society. 3. To promote the scientific, technological development and innovation of the Nation, programmed in the Political Constitution of 1991 and in the National Development Plan, in accordance with the guidelines established by the National Government. 4. To guarantee the necessary conditions for scientific, technological and innovative developments to be related to the productive sector and to favor productivity and competitiveness. 5. To ensure the consolidation and strengthening of the National Science, Technology and Innovation System. (SNCTI).

Source: own elaboration

However, despite the existence of a defined path, scientific research in Colombia does not seem to advance in the expected direction. On the contrary, ironically, it turns out to be a victim more affected by the lack of resources and opportunities; since, many times, there are few incentives or recognitions for new research projects that end up being affected by the phenomenon of national corruption.

This situation means that the funds earmarked for new research remain in the bureaucratic process, in the hands of intermediaries, and that these resources do not reach the purpose for which they were intended. This scourge, present in many countries, with greater incidence in emerging countries, is largely responsible for their technological, scientific and educational backwardness and,

therefore, continues to cause the growth of the acute social gap that already exists; consequently, it generates higher rates of poverty, hunger, violence and criminality, among other factors that affect social development.

This reality constitutes educational and cultural challenges where it is necessary to make the population aware of the conservation and proper use of public resources in favor of the common good as a training mechanism for new generations.

In this regard, the IDB states the following,

“The importance of educating future citizens in the values of integrity, citizenship, transparency and corruption prevention has been demonstrated through the results of a diagnostic study conducted by the Inter-American Development Bank (IDB) to 30,000 8th grade students in 6 countries of the continent (Chile, Colombia, Guatemala, Mexico, Paraguay and Dominican Republic). This study showed that the more civic education there is less permissiveness of corrupt practices and less tendency to violate the law” (Correa Fernandez, 2017) (Gonzalez & Gomez, 2014).

In the same way, a political challenge is incorporated that demands the implementation of control mechanisms that guarantee the progress of the investigative processes from a real and effective investment, that the entities responsible for monitoring the proper use of resources perform their task properly and apply the respective sanctions when necessary.

In accordance with the above, the great challenges and the complex challenges that Colombia faces, such as the search for the well-being, health and quality of life of its inhabitants; ensuring economic, technological, balanced and sustainable development for its entire population, addressing social and environmental problems or promoting peaceful coexistence and the promotion of cultural values and public goods, necessarily require the adoption of strategies based on the promotion of research.

The scientific research that will undoubtedly be at the basis of any relevant progress made in relation to any of the aforementioned aspects will be the fruit of the cooperative work of a group of researchers. In this sense, studies of scientific collaboration should provide both the members of the scientific community themselves and those responsible for scientific policies with clear and objective evidence about the value and usefulness of this. (Gonzalez & Gomez, 2014).

In that order of ideas, in order to achieve a more favorable scenario in Colombia, it is necessary to design strategies to face the challenges that follow;

1. Generate educational policies oriented towards the development and strengthening of research competencies, in the different educational contexts: although processes in this sense are being advanced, it is necessary to guarantee not only their existence but also their appropriation and applicability in the educational context, for this reason they must be assumed from a study based on the realities and diversities that make up the national territory, so that these policies are not reduced to a consumed rhetoric without the possibility of action. This should be projected in the short, medium and long term, extending to urban and rural areas of the public and private educational sector.
2. A budget earmarked for the development of research, science and technology that is tailored to the needs of educational centers, from where funding opportunities are provided for emerging projects: one of the difficulties surrounding educational research is the limited availability of resources to strengthen it from the school and even in higher education, to this reality, we must add the fact that when resources are available, they are often not used efficiently or are diverted to particular interests: therefore, in this sense, it is not enough only the adjustment of an effective budget, but also, it is necessary to have control mechanisms to ensure that the purpose of the financial resources is fulfilled.
3. Academic links, academic peers, articulation of academic networks that allow interdisciplinary work oriented to scientific collaboration: undoubtedly, a more effective growth of any component of the educational sphere is subject to collaborative work; it is a fact that the contributions of those who have ventured into any field of education will have a valuable contribution to offer to those who are just starting out. For this reason, it is essential to strengthen this factor, which is crucial in the theoretical foundation, in the construction of the state of the art, in the recognition of scientific findings, in publications and even up to the experimental phase of a research.

As Price noted, *“from the mid-twentieth century to the present, collaborative research has increased considerably, as has the number of scientists and organizations involved in the production of knowledge”* (1963). This increase in collaboration has been studied fundamentally through one of its main formal manifestations, the authorship of scientific publications.

The considerable increase in co-authored papers, should lead us to a deep reflection on aspects such as the attribution of scientific merit, the value of the signature in publications, ethics and the

implications of fraudulent conduct in relation to authorship or how to determine the contribution to the whole of each of the parts in collaborative work in evaluative systems based on the measurement of individual merit (Wray, 2002; Ruiz Pérez et al., 2014).

4. Training, qualification and updating of human resources, so that they are competent: This point could be considered the most important since, in the educational framework, the human resource turns out to be the key piece in any process of building it.

For this reason, a re-signification of knowledge is considered necessary so that, subsequently, the teaching process is established with quality and relevance, according to the demands of today's society. It should be added that this training must be of quality and must be guaranteed both in its initial undergraduate stage (professionals and graduates) and continuing through postgraduate studies.

Likewise, it must be taken into account that there are other axiological elements that must prevail in the training of those who assume this mission. This is how;

Creativity, the capacity for astonishment, the power of innovation, passion for teaching, charity, humility, tenderness, empathy, are some important elements in the art of teaching; teaching is an apostolate that should radiate in all senses and that, as teachers, requires us to empower ourselves from these basic principles. (Camargo, 2015, p. 4).

5. Permanent connectivity for the use of digital tools and access to information channels: Access to information through stable and permanent connectivity, especially for the most vulnerable sectors, is essential to ensure equal opportunities, since it is impossible to think that broad participation in calls, events, training and other training and meeting spaces can be achieved, without providing the possibility that those who do not have their own resources, are also involved.

It should be added that this requires digital zones, physical structures, operator networks with 4G technology, operating with minimum internet service costs or, if possible, free of charge.

In this sense, it must be said that there are still gaps in connectivity in the country, as confirmed by the director of the National Administrative Department of Statistics (Dane), Juan Daniel Oviedo Arango, who presented a balance of how Colombia is in internet connection, compared to digital

services and how are the most remote areas. *“Among the main reasons highlighted by the rural population for not having internet is that there is no coverage in the area, followed by the fact that the cost is very high. On the other hand, in the headwaters, citizens stated that the main reason for not having internet is that the service is very expensive”* (Oviedo, 2021).

To conclude, we can conclude that the progress of research in the 21st century is mainly subject to the training of researchers from an early age and for life, without ignoring that there are other determinants associated with educational quality such as: the use of digital tools, the implementation of innovative methodologies, the adaptation of the curriculum in response to an inclusive education. It is also necessary to invest in infrastructure, guarantee connectivity and qualify human resources, among other aspects that are related to economic support from the state, thus generating greater opportunities to minimize the existing gap between Latin America and the different world powers.

CONCLUSIONS

Given the above account, it can be concluded that important steps have been taken in terms of structure, which has been gaining significance and that, in one way or another, the demand for competitiveness has caused an awakening.

In that order of ideas, in order to achieve a more favorable scenario around research in Colombia, it is necessary:

1. Generate educational policies oriented towards the development and strengthening of research competencies, in the different educational contexts,
2. A budget earmarked for the development of research, science and technology that is tailored to the needs of the educational centers, from where funding opportunities are provided to the projects that arise.
3. Academic links, academic peers, articulation of academic networks that allow for interdisciplinary work.
4. Training, qualification and updating of human resources, in such a way that they are competent.
5. Accessibility to connectivity in such a way that access to information channels is guaranteed.

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