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Assessment Of The Knowledge Management And Innovation Status In The CITMA System In Pinar Del Río

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ABSTRACT

In a current context, information, knowledge and innovation are essential factors for society, the economy and territorial and organizational development. For these reasons, Cuba has implemented a science, technology and innovation system since 1995 with the purpose of achieving between the scientific community, the business community and the government. In order to identify the capabilities and limitations that the structures of the Ministry of Science, Technology and Environment of Pinar del Río have to manage knowledge, a diagnosis was carried out using the historical-logical and dialectical scientific method to know the foundations historical records that exist on knowledge management and its articulation in the science, technology and innovation system. A questionnaire was applied for data collection and documentary analysis that included the study of texts on the specialty and the main reported experiences. The main results show that these organizations fail to effectively transfer the information, knowledge and innovations available in the academic community to the business community. A program of actions is proposed that contemplates the design of a knowledge management model, creating capabilities for networking, renewing knowledge, articulating the social communication strategy that allows greater visibility and

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promoting the development of scientific potential based on of the territory's priorities.

Keywords: knowledge management; science; innovation; academic community; business community.

INTRODUCTION

In a competitive and changing context like the one that exists today, information, knowledge and innovation are essential factors for the economy of countries, the development of a territory, the performance of an organization and the lives of people. To achieve effective use of information, knowledge and innovation in an organization, it is necessary to assume the basic functions defined for technological management: inventory, optimize, evaluate, enrich, protect and monitor. [1-4]

It is also recognized that today the success of organizations lies in sharing, learning and collaborating; not in the accumulation and control of knowledge. Organizations that develop a culture of information and knowledge management manage to become advanced entities and engage with society to provide the benefits of the knowledge generated. [5] Having prepared people and equipment is, therefore, a necessary condition, but not sufficient, for an organization to be able to generate and use knowledge better than others. [6]

Generally, an organization on its own cannot implement the functions stated above and has to turn to entities dedicated to the generation and consumption of knowledge that act as , called interface structures, and which are often underused despite having great importance. . Many countries have recognized this type of organization as a fundamental actor in the science, technology and innovation (SCTI) system.

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Castro and *Rajadel* point out that interface structures are an alternative to materialize the integration of science, technology and innovation, and create internal and external technological environments. [7] They consider that knowledge management plays a strategic role in them, a complex process that the organization develops, where the generation, transformation of knowledge and its conversion from tacit-explicit stand out, and in which human resources play a significant role. information, information technologies and communications.

Academia-environment relationships, in less developed countries, have been discussed in most cases and theories have been exported, without delving into the knowledge of the phenomenon. [9] For *Gutiérrez* , the alliance between companies, research institutes and government structures is the route to follow to materialize the R+D+i process. [10] *Suárez* and *Jiménez* also agree with this criterion , who also propose that production and services require today more than ever the presence, support and help of the scientific sector to take the path of knowledge and innovation. [11] In this sense, knowledge management, according to studies by several researchers, involves three essential components: information management, human resources and technology, with the intention of perfecting the processes with the greatest impact and achieving better exploitation. of knowledge, based on intensive use of information technologies. [12,13]

In Cuba, the political will of the state in favor of better management of information and knowledge in organizations is evident, particularly the National Plan for Economic and Social Development until 2030, [14] specific action that offers a proposed vision of the nation, axes and strategic sectors of Cuban society. They stand out within the six strategic axes that it describes, two directly related to the

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topic of this research: the one referring to effective government—human potential—and the one oriented to science, technology and innovation. A high degree of priority is given to the management of government, human resources and, in general, the development of science, technology and innovation. It is worth noting that this Plan specifically defines within its general objectives to develop highly qualified human potential and guarantee conditions for its protection and stability, as well as to increase the impact of science, technology and innovation in economic and social development, including the improvement of the institutional framework and the capture and assimilation of advanced technologies, at the same time promoting the technological sovereignty of the country.

In Pinar del Río, the entities that make up the CITMA system have a strong impact on this entire process because knowledge is their main asset. It is essential for them to understand and participate in the management of the knowledge they possess and generate for the territory, in addition, the construction of relevant knowledge, disseminate it and create the conditions for its application, as it is specialized knowledge. This procedure requires human resources with greater expertise, with greater information competencies and better skills in the use of computer technologies.

Based on the analysis of the reports resulting from the controls carried out in the last five years by the science and technology unit of the CITMA delegation and the limitations posed by *Triana* , [8] the authors of this investigation consider that in the territory of Pinar del In Rio, there is insufficient exchange of information between SCTI actors, limited socialization and application of scientific results, duplication of resources, loss of large amounts of information and knowledge in organizations

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due to not having the appropriate infrastructure. Knowledge is stored by SCTI areas and is not shared or socialized in its entirety. There are also difficulties in recognizing the knowledge niches that people possess and a complete link between the scientific community (knowledge provider), the business community and the government (demanders) is not achieved. That is why, to promote knowledge management and technological innovation, it is necessary to have entities that articulate the demander of knowledge and innovations with the provider of these resources, because in many cases the former does not know what is available or is being created in academic institutions, and they do not know what needs the producer of goods and services has.

The entities of the CITMA system in Pinar del Río, for the most part, perform interface functions and play a fundamental role in achieving between the scientific community, the business community and the government. The previously stated approaches led the authors to the following question: How to improve the functioning of the interface structures of the CITMA system in Pinar del Río to promote knowledge management and innovation?

The objectives of this research are to carry out a diagnosis of the capabilities and limitations of the structures of the CITMA system in Pinar del Río as interface entities to manage knowledge - taking into account the identification and functions, the potential for knowledge and infrastructure, the scope of work, the products and services that are executed—and design a program of actions for their improvement.

METHODS

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The historical-logical and dialectical method was applied to determine the trends and the examining study of previous works on the subject, as well as to use these as a point of reference and comparison of the results achieved, which allowed us to know the historical foundations that exist. on knowledge management, innovation and its articulation in the science, technology and innovation system.

To analyze the theoretical framework, documentary analysis was applied, which included the study of the literature of the specialty and the main experiences reported in the texts, serial and electronic publications, from Cuba and other countries, as well as the reviews of the documents. leaders established in the country on the subject. To establish the diagnosis, a questionnaire designed by the authors was applied based on the combination and adaptation of the diagnostic guide of the European Business Excellence Model (EFQM Model). [15] From this, the questions related to alliances and resources, key results, results for clients, and results for people and society were adapted. In addition, the questionnaire applied in the second national innovation survey in Cuba [16] was used to evaluate the link between the scientific community and the business community. Finally, the tool applied at the national level by *Faloh Bejerano* was adapted to characterize the interface in the country, as an important contribution to the materialization of the strategy of productive and service organizations, with which the linkage of these with the environment. [17]

The designed questionnaire considers four variables with a total of 34 questions, which allow the entities of the CITMA system to be characterized in terms of identification and functions, knowledge potential and infrastructure, scope of work, products and services that are executed. It was applied to 331 workers, from the

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seven interface units that make up the CITMA system in Pinar del Río, prioritizing managers, officials, executors of R&D&I projects and specialists related to knowledge management and innovation. This made it possible to identify the main limitations and potentialities for managing knowledge.

ANALYSIS OF RESULTS

IDENTIFICATION AND FUNCTIONS

It is considered that the entities of the CITMA system act as organizational structures of interrelation or interface, which, located in a contact, intermediation or link area, favor the exchange and use of knowledge and innovations between demanders and suppliers of these resources, fundamentally between the academic and business communities, with the aim of promoting the development of both.

Based on the results of the questionnaire, the characterization of the entities of the CITMA system in Pinar del Río was carried out. Its founding origins have their antecedents in the Cuban Academy of Sciences. In 1994 the Academy was divided and this Ministry was created at the national level, and in the provinces the functions were designated to the delegations of the Academies of Sciences; The territorial delegates were appointed as the highest authority at the provincial level and subsequently expanded their functions until reaching the structure it currently has. The CITMA system in the province is made up of six entities and the Territorial Delegation, which has five organizational units broken down into:

- Science and technology unit.
- Environment unit.

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- Comprehensive organization and management unit.
- Mountain organ.
- Municipal specialists.

Subordinate to the delegation are the Provincial Historical Archive, the Environmental Research and Services Center (ECOVIDA) and the Budgeted Assurance and Logistics Unit. The Information and Technological Management Center, the Territorial Normalization Office and the Provincial Meteorological Center belong to the system and represent national entities in the territory. The business system is represented by the CITMATEL Differentiated Business Group in Pinar del Río, subordinate to the CITMATEL Differentiated Business UEB of the Advanced Information Technology and Telematic Services Company.

It is highlighted that for their management they adopt different organizational forms ranging from management centers, units and management groups. On the other hand, it is evident that 100% of the structures finance some activity from the state budget and 50% assume their functions from the state budget and from charging for their services. The result of the questionnaire shows that the fact that there are two ways to finance functions, the state budget and the sale of services, gives a guarantee to the functioning of this type of organization.

It was also confirmed that most of these structures emerged in the last decade of the 20th century. 60% of these entities are administratively subordinated to the Territorial Delegation that serves as representative of the CITMA ministry in the province, and 40% to national organizations of this ministry itself, so most of them do not have their own legal personality. The study indicated that the structures of

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the CITMA system in Pinar del Río assume 27 specific functions fundamentally associated with services of:

- Training and development of human resources, organization of events, consultation with experts, management of innovation projects and advice.

- Consulting in quality management, environment, scientific and computer information.

- Access to databases, search for specialized information, technology transfer, editing of scientific publications and library services.

It is evident that there are functions reported for this type of structure that are not fully executed, such as technological surveillance, technical-economic feasibility studies, market opportunity, prospective and business intelligence, preparation of business plans, technological audits and legal advice on issues within their areas of competence, which must be taken into account for their transformation.

KNOWLEDGE POTENTIAL AND INFRASTRUCTURE

When carrying out an analysis of human resources, it is highlighted that these entities have 552 workers; Of them, only 49% have a university level. It is worth noting that there is heterogeneity between the centers that make up the system in relation to this aspect. The Ecovida Research and Environmental Services Center stands out, with the category of research center, which carries out scientific research and innovation as a fundamental mission, together with the provision of scientific and technological services with added and exportable value related to the activity of Research development. However, only 26.5% of university students

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have a master's degree in science and the increase in obtaining teaching and scientific categories is considered positive (table).

This composition facilitates the fulfillment of the assumed functions, although it is worth highlighting that it is not enough to have a critical mass of graduates; It is necessary to consider what specialty they have, what attitudes they assume and what skills they have to materialize their work, so that it helps to promote more effective knowledge management, even with the proper management of Information Technology and Communications.

90% indicated that they have an internal computer network with partially adequate performance. Email is used to transmit data and information and they have access to the internet and the website. 80% of those interviewed reported that they create a database on different media and 90% consider that they have enough information to do their job. The existence of technologies is evident; However, it is necessary to improve access to knowledge, foster an environment conducive to its exchange and create new roles, competencies and responsibilities.

ANALYSIS OF THE SCOPE OF WORK, PRODUCTS AND SERVICES EXECUTED

The area in which the entities perform their functions was considered the scope of work. 50% of the units reported that they carry out their activities to satisfy government demands, while 70% indicated that they provide services to individuals and 100% reported this function for companies and organizations, which denotes a priority towards production. of goods and services. Only 50% are oriented towards the scientific community, an aspect that can be a limitation in

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materializing the scientific community-business community link. None reported that they interacted with any financial entity.

The analysis of the products and services most executed by the entities and the projection abroad was carried out based on the participation of their specialists in trade fairs, technical events, courses, networks and projects. From the information obtained, it was concluded that the most produced products and services are:

- Training of human resources.
- Technical advice and consultancy.
- Consult experts.
- Search for specialized information.
- Environmental services.
- Execution of R+D+i projects.
- Verification and calibration of measuring instruments.
- Supervision of R+D+i projects, companies, entities and organizations.
- Publication editing.
- Connectivity services.

The results indicate that the products and services executed do not fully develop the functions or activities identified for this type of organization; Those associated with technological surveillance, prospective studies, market and industrial property studies do not appear among the strategic products, since the CITMA entities—in order to ensure their state functions, sales and income—respond to the most pressing needs. urgent and necessary demands of the plaintiffs, an issue that constitutes a barrier to the knowledge and innovation management process.

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Regarding trade fairs, territorial, national and international networks, 100% considered their participation low, which shows that this type of activity is not used to market the portfolio of products and services, position itself in the market, establish cooperative alliances , identify new opportunities and integrate, and it was evident that the operation is isolated.

PROPOSAL OF ACTIONS TO REDUCE THE EXISTING LIMITATIONS AND IMPROVE THE EFFECTIVENESS OF THE CITMA SYSTEM

Based on the diagnosed situation, it is proposed:

- Design a knowledge management model that allows the compilation, normalization, processing and analysis of information on science, technology, innovation and the environment, which would contribute to better decision making and raising the impact of scientific results and of technological innovation.
- Create capabilities for networking, using information and communications technologies (ICTs) that facilitate the transfer and use of knowledge between all interface units of the CITMA system and favor their response capacity.
- Promote the identification, development and control of the scientific potential of the province to obtain a multiplier effect in its use based on the interests of the territory, direct its insertion in the work of social networks and the creation of institutional profiles that promote greater visibility and positioning opportunities.
- Renew the knowledge of people and organizations through learning processes, through the exchange of experiences between professionals from different areas on a specific topic of high scientific and technological novelty, as well as the execution of training actions on the strategic products that have not yet been

promoted in these entities, fundamentally technological surveillance, prospective, market and industrial property studies.

- Incorporate in the social communication strategy of the entities of the CITMA system communication actions that allow greater visibility of the interface structures, such as provincial, national and international fairs, technical scientific events, forums, wikis, blogs and other spaces of discussion to share knowledge that allows marketing the portfolio of products and services, positioning oneself in the market and identifying new opportunities.

FINAL CONSIDERATIONS

The research shows the capabilities and limitations that the structures of the Ministry of Science, Technology and Environment in Pinar del Río have to manage knowledge and innovation, while they act as interface structures that favor the exchange between demanders and suppliers, fundamentally between the academic and business communities.

It is evident that the CITMA entities promote responses to the most urgent and necessary needs of the plaintiffs, in order to ensure their state functions, sales and income, an issue that constitutes a barrier to the knowledge and innovation management process. . In addition, limitations associated with material resources, positioning and personnel with the skills required for its development are noted.

A program of actions is proposed to reduce existing limitations and improve the effectiveness of these organizations by designing a knowledge management model, creating capabilities for networking, renewing the knowledge of people and organizations, articulating the social communication strategy that allows greater

visibility of these interface structures and promotes the identification, development and control of scientific potential based on the priorities of the territory.

Authors' contribution

Yury Triana Velázquez, Cecilio Valdés García designed the research, analyzed the data and wrote the first version of the article; Maytee Martínez Domínguez and Ydania Varela Pérez carried out the data collection and the data analysis process. All authors reviewed the manuscript and approved the version finally issued.

Conflict of interests

The authors declare that they have no conflicts of interest in carrying out the study.

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Sustainable Development Through Public Libraries

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ABSTRACT

Public libraries are sociocultural institutions committed to sustainable development. Since the 19th century, its services have generated benefits in the communities and have their full participation. Within the framework of the 2030 agenda, public libraries demonstrate their value and influence in the informational and social development of individuals, groups and institutions. In this sense, the objectives of the United Nations 2030 agenda are identified and the main work directions of public libraries around sustainable development based on the method of documentary analysis are presented. This exhibition is carried out based on four dimensions: open access and citizen participation, inclusion, cohesion, empowerment and local development, identity and memory, and sustainable spaces and actions. This allows us to notice the diversification of the actions of public libraries and reaffirm their relevance together with other public institutions in the construction of sustainable societies.

Keywords: public libraries; sustainable development goals.

INTRODUCTION

Public libraries are social institutions committed to the informational and social development of communities. The diversity of terms with which the actions and

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responsibilities of public libraries are defined represent their versatility and multipurpose orientation.

Public libraries serve individuals, groups and entities of the communities in which they are inserted with a public and ethical character; hence they can be connected with the term *service* . Its facilities evolve in correspondence with the social uses and the expressed needs of the communities, which is why they are considered *third places* and *meeting places* ; This reaffirms its status as a safe and comfortable institution for socialization and collective construction. They are appreciated as "those third places, after the workspace and the home, where people go simply for the pleasure of being: to interact, to talk, to hang out." [1]

Public libraries can also be understood as social and cultural agents, as they encourage the taking advantage of opportunities and the creation and use of tools for communities to discuss their problems and find the best solutions. They are visualized as living spaces with a marked democratic and sociocultural orientation.

The analysis of the contributions of authors such as *Jaramillo and Montoya Ríos,* [2] *Domínguez Sanjurjo and Merlo Vega* , [3] *Gómez Hernández* , [4] *Sánchez García and Yurbero* , [5] *Gallo León* , [1] *Álvarez Ruiz and Manso Rodríguez* , [6] among others, reflects the presence of a set of labels when describing and systematizing the actions of public libraries in communities. The most recurring labels are: access, inclusion, literacy, learning, equity, participation, development, transformation, integration, multiculturalism, culture of doing and resilience. The careful examination of these and other contributions has made it possible to synthesize the current functions of public libraries in five statements. Public libraries:

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- They promote free access to information.
- They promote inclusion and social cohesion in info diverse and multicultural spaces.
- They contribute to training and lifelong learning.
- They promote citizen participation.
- They promote the empowerment and development of the community.

These functions represent the diversity of actions of contemporary public libraries and allow us to see their contribution to sustainable development; especially taking into account that "public libraries contribute to the creation of vital and unique communities, developing their flexibility, diversity, interconnections and adaptability, through the creation of spaces, services and information products to support formal education, social inclusion, gender equality, strengthening the learning capacity of individuals, environmental conservation and historical memory." [6]

In this regard, the International Federation of Library Associations and Library Associations (*IFLA*) [7] connects the objectives of the United Nations 2030 development agenda with the actions of libraries. Through examples, it illustrates the actions carried out by libraries in different regions of the world to contribute to each objective of the agenda. *IFLA* points out that the main actions are:

- Promote universal literacy, including digital, media and information literacy and skills, with the support of specialized personnel.
- Overcome difficulties in accessing information and helping government, civil society and business to better understand local information needs.
- Implement a network of delivery sites for government programs and services.

- Promote digital inclusion through access to ICT.
- Act as the center of the academic and research community.
- Preserve and provide access to the world's culture and heritage. [7]
- Train to promote new skills necessary for education and employment.
- Offer access to] inclusive spaces where cost is not a barrier to acquiring new knowledge and skills.

- Socialize research available in medical and hospital libraries that support education and improve the medical practice of healthcare providers.

- Disseminate information about health and well-being (...) to help people and families maintain their health.

- Manage public access for agricultural producers and other entrepreneurs] to online resources.
- Promote a group that promotes early literacy and continuous training. [8]

Most of the actions identified by *IFLA* [7] correspond to the actions of public libraries. These institutions are at the forefront with accessible information services in response to the interests and demands of the different groups and institutions that make up the communities in which they are located. Its actions promote dialogue and transparency between citizens and public administrations, a key relationship that makes possible the achievement of a society project in accordance with the objectives declared in the global agenda for sustainable development. In this sense, the purpose of this exhibition is to identify the objectives of the United

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Nations 2030 agenda and present the main actions of public libraries around sustainable development.

SOME PRECISIONS ABOUT SUSTAINABLE DEVELOPMENT

Since the 20th century, a marked concern towards sustainable development has been expressed by many nations. Since 1972, at the Stockholm Earth Summit, [8] a declaration marked by a call to preserve and improve environmental conditions for future generations has been discussed and signed. It is from this summit that people begin to think and speak in a language where the sustainable development category is the protagonist.

In 1987, the report "Our Common Future in the World Commission on Environment and Development" was presented, which established the concept of durable (or sustainable) development as "development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. [9]

More than four decades of meetings have promoted the exchange of different organizations and countries, and their results have materialized in declarations and programs with different scope. The Rio Conference (1992) and its declaration on Environment and Development, together with the Kyoto Protocol (1997), are the main antecedents of the Millennium Declaration established in the year 2000. This declaration presents the objectives of the millennium that in the period 2000-2015 guided the development projections of the countries that signed it. However, it was not until 2015, with the presentation of the 2030 development agenda, that a better structured projection and greater awareness and political will to drive its implementation were perceived.

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In a resolution approved by the United Nations General Assembly on September 25, 2015, the participants, representing their countries, agreed to work collaboratively to achieve 17 objectives and 169 sustainable development goals with a view to the year 2030. [9] That agenda outlines the projections that allow continuity with the pending millennium development goals and incorporate new aspirations to build more equitable, dignified and prosperous societies. Although each country must adjust the objectives and goals to its reality, its vision and its strategic projects, the scope of the proposal and the importance of the subscribing nations directing their efforts towards common objectives to move towards sustainable societies in the dimensions undeniable. social, economic and environmental.

This new proposal presents a sustainable development approach that can be contextualized as a comprehensive model that projects economic, sociocultural and environmental progress, as well as the permanence of the physical, mental and spiritual health of a society based on its conditions and needs. departure and with a view to its existence and positive transformation for the future.

The following objectives summarize the main work directions that make up the 2030 agenda to be materialized between 2015 and 2030:

- End poverty in all its forms and throughout the world.

- End hunger, achieve food security and improved nutrition and promote sustainable agriculture.

- Guarantee a healthy life and promote the well-being of everyone at all ages.

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- Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

- Achieve gender equality and empower all women and girls.

- Ensure the availability and sustainable management of water and sanitation for all.

- Guarantee access to affordable, reliable, sustainable and modern energy for all.

- Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

- Build resilient infrastructure, promote inclusive and sustainable industrialization and encourage innovation.

- Reduce inequality within and between countries.

- Make cities and human settlements inclusive, safe, resilient and sustainable.

- Guarantee sustainable consumption and production patterns.

- Adopt urgent measures to combat climate change and its effects.

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- Conserve and sustainably use the oceans, seas and marine resources for sustainable development.

- Protect, restore and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, fight desertification, halt and reverse land degradation and halt biodiversity loss.

- Promote peaceful and inclusive societies for sustainable development, facilitate access to justice for all and build effective and inclusive accountable institutions at all levels.

- Strengthen the means of implementation and revitalize the Global Alliance for Sustainable Development. [9]

The agenda has been set by international organizations and has been translated into a global declaration that requires the implementation of specific policies and strategies. It is conceived as "an action plan for people, the planet and prosperity, while it aims to consolidate peace and requires the development of alliances for its implementation." [9] Its materialization rests on the implementation of policies, strategies and projects with different scopes. However, the complexity of the purposes to be achieved in 15 years involves multidimensional performance and the implementation of macro, meso and microstructural changes that may lead to questioning their viability.

That is why it is vital that it be "a transformative, people-led agenda whose foundations (...) rest on] transparency, participation and inclusion." [9] Only through

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dissemination, access, commitment, learning, action and collaborative participation is it possible to move towards its achievement. Responsibility must be real and shared, each decision-maker and social actor must be aware of and be an active part of the decisions and actions that are taken and carried out in their context in that direction.

METHODS

A documentary investigation is carried out within the framework of the Public Library and Community research group, of the Faculty of Communication of the University of Havana. From this group, a broader research project is coordinated that seeks to delve into the contemporary actions of public libraries connected to sustainable development.

In this case, documentary analysis and triangulation of information are used as the investigative process progresses. The selected documentary sources were obtained from multiple consultations in Spanish and English under the expressions "sustainable development", "public libraries", "sustainable development and public libraries", "contribution of public libraries to sustainable development". The queries were carried out between November 2017 and February 2018. The search period was set as 2014 to 2017/8 in Google, Google Scholar, E-LIS, EBSCO and SCOPUS.

The information constructed from the analysis of the most relevant documentary sources was connected with the results of the analysis of the current functions of public libraries from what was expressed, among other authors, by *Jaramillo and Montoya Ríos,* [2] *Domínguez Sanjurjo and Merlo Vega,* [3] *Gómez*

Hernández, [4] and *Sánchez García and Yurbero.* [5] In accordance with what was noted in the literature analyzed, the findings on the topic of interest were organized into four interconnected dimensions for accuracy: open access and citizen participation; inclusion, cohesion, empowerment and local development; identity and memory; and sustainable spaces and actions.

All of the above supported the authors' approaches regarding the contribution of public libraries to sustainable development. Although it is not a field investigation, triangulation has been the main methodological strategy to note the participation of public libraries in the materialization of the 2030 agenda.

RESULTS

Among the public institutions that can contribute most clearly to the purposes of the 2030 agenda are public libraries, not as isolated entities in a locality, but as unifying and social participation centers for, in and with communities in direct contact. with public administrations and local development projects.

The spaces, services and information products of public libraries support the materialization of this agenda. The way in which they are created and offered through research and evaluation with the continuous participation of community members (users and non-users) ensures their relevance and diversity, and lays the foundations for the generation of a favorable social impact. It coincides with what was expressed by *Ramos Chávez* [10] when he maintains that the information that is managed, accessed, constructed, socialized and used in public libraries helps citizens to:

- Exercise their civil, political, economic, social and cultural rights.

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- Be economically active, productive and innovative.
- Learn and apply new skills.
- Enrich your identity and cultural expressions.
- Be part of decision-making and participate in an active and committed society.
- Find community-based solutions to development challenges.

- Ensure accountability, transparency, good governance, participation and empowerment.

- Measure the progress of public and private commitments to sustainable development. [10]

The development of the dimensions that we will show below allows us to connect with and expand the details of *Ramos Chávez* [10] on the topic of interest.

OPEN ACCESS AND CITIZEN PARTICIPATION

Public libraries defend transparency, accountability and rapprochement between citizens and governments. They provide access to open data and draw on it to support decision-making that translates into better actions. In this regard, *Hernández Pérez* [11] points out that public libraries must "raise awareness about the value of data and metadata in the digital world and its impact on the privacy and rights of the individual." [eleven]

They promote awareness and social action around key issues such as health, education, agriculture, equity and the environment. Public libraries manage and make accessible accurate information that facilitates decision-making and citizen action to promote individual and common well-being.

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Connections with local institutions and governments are some of its strategic directions to ensure their participation in local development policies. Public libraries constitute spaces for meeting and socializing in person or virtually between members of institutions, projects and community groups. When developing services and products, they create alliances among themselves and with local, national and regional entities that can be both beneficiaries and beneficiaries. [7]

Access to accurate information of a strategic nature and on public services is among the main services of public libraries, mainly through the community information service. This service generates responses to information needs of a geospatial, administrative and citizen nature related to the locality or the scenario where they are inserted. To the extent that citizens recognize and use quality information about public services and the efforts of their representatives, they can make better decisions and assert their rights.

The platforms and web spaces accessible from public libraries, together with the advice of librarians, allow citizens to carry out procedures, complaints, apply for subsidy and investment programs and access opportunities that can promote their development and well-being.

INCLUSION, COHESION, EMPOWERMENT AND LOCAL DEVELOPMENT

Inclusion, cohesion, empowerment and local development are constitutive categories of the sustainable development model, while they represent the goals of current strategies, oriented towards this end by public libraries.

Closely related to each other, the concepts of inclusion, cohesion and empowerment acquire their transformative meaning only if they pursue local

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development and condition the functions of public libraries that, through their actions, must promote the conversion of citizens into social actors, capable of carry out its transformation based on the common efforts of community members. It should be noted that these actions cannot be uniform, but must adhere to two dimensions: on the one hand, the real possibilities of public libraries and, on the other, the characteristics of the communities, their problems and development projects.

At the same time, most of the authors agree with what *Bravo* [12] points out regarding the "catalyzing role that a public library must play within its community, becoming a meeting and contact center (...) and] in a public space of relevance". [12] In this regard, there are numerous good practices, understood as experiences that have yielded positive results, and have demonstrated their effectiveness and usefulness in a specific context and that can serve as a model for other public libraries.

Among the projects carried out in the communities, those aimed at promoting reading and cultural promotion stand out. With the support of local governments, these projects become effective tools not only to enhance the teaching-learning process, but also to deschool public libraries and transform them into spaces for communities and not only for schoolchildren. [13] That is why it is stated that public libraries act as cultural centers of communities and ensure that their spaces have greater social use.

When creating their collections and services, public libraries usually take into account the integration of the different minorities that make up their communities. Its services allow the monitoring of cultural integration to be

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combined with liaison functions between immigrant communities and native communities. Among the objectives they usually pursue are the reduction of linguistic and cultural barriers, and the promotion of mutual respect. [14] They also include in their projections the characteristics of the spaces where they are inserted and with which they dialogue; They conceive urban public spaces as means to create, strengthen and enhance citizen culture and participate in the sociocultural processes of communities.

Attention to vulnerable groups or groups at risk of social exclusion is among the actions of public libraries that are most obviously interconnected with the objectives of the 2030 agenda. Depending on the groups they target, they design, implement and they participatively evaluate their proposals. These are actions "in their area of intervention, which seek their intersectoral and inter-institutional linkage, as well as their positioning and appropriation among members of the community." [fifteen]

Regarding the empowerment of communities and the inclusion of all their members in transformation projects, information and digital literacy processes occupy an important place. "The fact is indisputable that the citizen who knows how to take advantage of electronic or printed sources of information (...), is in better conditions to assert his rights, both civil, human, economic, social, of expression, and cultural and politicians". [16] To achieve this, the most diverse strategies are developed. Programs and services that generate skills and knowledge related to the search, retrieval, evaluation, use, socialization and creation of information in different media are at the center of public libraries' projections to enhance development. sustainable. The skills in the use of ICTs and the access that

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public libraries can provide in their spaces help people solve a problem as vital as searching for employment.

Short courses at various times of the year are other of the services most requested by communities from public libraries; Among them, those that offer basic training in topics related to the Internet and computing stand out. These courses usually include training in essential skills ranging from knowing how to write an email and establish contacts to more pragmatic issues such as making a doctor's appointment, paying utility bills, booking tickets for shows, downloading programs, learning languages online, read magazines and newspapers, use translators and listen to music. [17]

Public libraries contribute, directly or indirectly, to each user being an "active person, producer of economic and social advances; in addition to contributing to the development of the community to which they belong (...), which enables them to actively participate in decision-making, contributing to sustainable development" [16] . They share information about development plans and opportunities, encourage shared entrepreneurship and the emergence of small businesses that can generate economic and social benefits in the communities.

Authors such as *Figueroa* [18] also perceive the impact of public libraries in the formation of virtual communities active in the discussion, exchange and construction of information and knowledge that can support part of the decisions and actions of citizens and local institutions.

The services offered by public libraries together with communities encourage social contact and intergenerational encounters. The programs they support to promote inclusion and social cohesion in communities with inhabitants who

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profess different religions or have different origins and customs constitute good practices. Public libraries defend multicultural diversity through the management and use of information in accordance with the interests of the sociocultural groups that make up the communities to which they serve. Collaborative work and the provision of services to community groups, schools, community centers and users with similar interests encourages closeness and dialogue between people; This is essential for building a harmonious life based on respect, the preservation of traditions and the promotion of cultural diversity. [7]

IDENTITY AND MEMORY

One of the fundamental roles of public libraries is to be repositories of the bibliographic-documentary heritage of a town, province or region. [19] Said heritage, in these institutions, constitutes evidence of people's daily lives and allows the lines of their history to be preserved; which is why it is maintained that public libraries contribute to the generation of a developing collective memory.

The services provided by public libraries to the communities they serve in their range of action aim to promote access to information and knowledge in different variants. One of the main sustainability strategies regarding access and dissemination of collective memory and identity is to establish alliances to guarantee equitable access to knowledge resources.

The 2030 development agenda, in specific objectives, calls for developing actions, through the management of documentary heritage, based on the need for its preservation and access. Information services that rescue in localities and regions forms of sustainable agriculture, ancestral practices, contained in the memory of a

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locality, will be fulfilling, for example, objective 2: "End hunger, achieve food security and improve nutrition and promote sustainable agriculture. [9]

The information services of public libraries linked to the loan of digitized documents that make up the local bibliographic heritage contribute to the materialization of objective 3: "Ensure a healthy life and promote the well-being of all at all ages" [9] . In turn, the services, spaces and information products designed and implemented by public libraries for the promotion of trades that have been lost, together with the teaching of these as a local heritage with a gender perspective, respond, among others, to the objective 5: "Achieve gender equality and empower all women and girls." [9]

Goal 11 proposes to "make cities and human settlements inclusive, safe, resilient and sustainable. [9] stated later in actions such as 11.4: "redouble efforts to protect and safeguard the world's cultural and natural heritage", translates in public libraries into strategies and actions that enable access to and enrichment of the memory and identity of communities, and is supported by multimedia collections that reflect local history, traditions and values.

According to *Álvarez Ruiz and Manso Rodríguez,* [6] public libraries foster the ability of communities to learn and adapt flexibly to contextual changes without forgetting their history and cultural heritage. They are not only depositaries and promoters of documentary heritage; In addition, they build and strengthen, together with the communities, the local cultural heritage and their vital memory.

SUSTAINABLE SPACES AND ACTIONS

In dialogue with the ideas of *Jaeger, Bertot, Kodama, Katz and DeCoster* [20] "libraries have been flexible and adaptive organizations to the extent

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that they have sought to respond to the needs of their users, communities and society as a whole" [20] having take into account the political, economic and sociocultural transformations that have occurred in their contexts of action.

The analysis of the actions of public libraries presented in the previous sections shows their real commitment and participation in the construction of inclusive and conscious societies. However, the sustainability approach from public libraries cannot only be perceived in that direction. At present, the buildings and interiors of public libraries are transformed, to promote socialization and individual and collective creation, into open, neutral, welcoming, plural and multifunctional spaces; that is, in sustainable environments.

Designers and architects are committed to "friendly" spaces with the environment; especially when it comes to the design of new buildings for construction. Among other factors, the location of the building and its rooms is considered according to the incidence of natural light throughout the day, the direction and circulation of the winds, the presence of groundwater that allows access to alternative sources for the air conditioning, the social uses of the surrounding spaces, the traffic of people and means of transport, environmental noise, the availability of local materials and human resources, the pollution levels that the works will generate and the alternatives to reduce them. Hence, a revival of "modern Scandinavian architecture (...), which emphasized the use of sunlight, natural materials, social harmony and contact with nature" is perceived as a trend in the new public libraries. [1]

Sometimes, redesigning public library buildings is not feasible; In these cases, redesigning the use of existing spaces based on their multifunctionality as well as

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the strengths and opportunities offered by the context in which they are located may be a more sustainable path. There are other measures that also involve significant but profitable investments as they can be recovered in the medium term taking into account the reduction in expenses, the capacity of use and the benefits that they can generate. This involves, for example, the replacement of lighting and equipment with products that offer equal or better performance with lower consumption of resources, the installation of solar panels and other renewable energy sources. Among the main options for public libraries to access these types of transformations are the initiatives of governments and competent institutions associated with projects connected to the 2030 agenda at a regional or local scale for the creation of smart cities, green-ecological cities or governments open.

It is not considered possible to position public libraries as institutions that promote sustainable development if, with their own infrastructure and operation, they do not defend a responsible attitude and generate good practices for social well-being and environmental protection in the broadest sense of the term.

When referring to the redesign of buildings and interiors of public libraries, reference is also made to the transformation of the informational and sociocultural uses and practices that occur in these spaces. Sustainability implies a change in the attitudes, relationships and ties established between people, information and the places in which they consume, create and share information and knowledge in any of its expressions. Therefore, when we refer to sustainability we also talk about a change in worldview.

It is considered that the sustainability approach defended by public libraries should be the result of institutional philosophy and projections; Therefore, it must be

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shared by its members. Hence, it is pointed out that the materialization of the sustainability approach must be evaluated and projected as part of the strategic planning of public libraries. In this regard, it is argued that the processes of constructing strategic projections in public libraries must include an analysis of the past and present in terms of cost-benefit relationships, access-use-impact, weaknesses-strengths and threats-opportunities. Trend and prospective studies are a vital tool to project the sustainability of your actions and spaces in the short and medium term, as well as to establish flexible directions that mark the organizational direction in the long term.

Another direction, which shows its commitment to a more sustainable operation, refers to its participation in international initiatives for open access and integrated management systems. Such systems enable the management and optimization of information processes common to library activity: organization, representation and retrieval of information, evaluation, among others. They tend to promote a balance between automated registration, control and organization procedures, and actions and decisions that depend on individual and collective intellect. Although progress has been made in this direction, it is considered that public libraries face multiple challenges mediated, among other factors, by the predominance of proprietary systems, conflicts over copyright and licenses granted, the description of documents of different nature and typology, and the need to have multidisciplinary teams with the skills to develop open source initiatives, systems and programs in correspondence with the particularities of the contexts to which they must respond.

Although there are still multiple challenges, it is noted that the growth of interoperability between information systems with friendly and unique

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interfaces [21] is influencing library concepts and practices, social interactions, as well as the information consumption and behavior of communities and interest groups. Interoperability between information systems is promoting the reuse of quality public data and information, which can reduce the costs of services and products, strengthen and make visible the economic and sociocultural impact of public libraries, and support decision-making at an individual scale. and collective, and place communities in front of better opportunities for their entrepreneurship and well-being.

In addition, public libraries often integrate popular technologies and applications to diversify their proposals, adjust to the interests and practices of communities and contribute to optimal use of mobile devices and the equipment available in their rooms. For example, augmented reality and QR codes complement and expand the concepts and proposals of the services and information offered on documentary resources. [22] According to *Millán Reyes* , [23] the topics and realities that are usually associated with the term smart libraries are connected to a greater extent with several topics: "use of ICTs, artificial intelligence, robotics and sensors; (...) intelligence models in psychology, (...) development of smart cities where the library is an agent for its achievement, and other (...) more specific, [23] such as the use of cards, codes and data to identify staff, users and the status of your relations with the library.

In this sense, it is essential to carry out research on the impact of access-use-socialization of/in library spaces, services and products. This requires adequate management of data and information throughout its research, design and

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implementation phases, but above all it demands participatory monitoring of a quantitative and qualitative nature once they have been offered.

In relation to impact studies, economic impact is usually referred to, since the presence of quantitative indicators and instruments have been developed more systematically in line with the processes of transparency, justification of public investments and decision-making. administrations on budget allocations [20] based on the capacity of public institutions to generate economic benefits. In this panorama, public libraries face the challenge of determining and communicating their economic impact in correspondence with the models and practices required by the governments to which they subscribe, and, at the same time, evidence their sociocultural impact based on knowledge, experiences and testimonies that they obtain and build from scientific research and their daily interactions with the communities.

CONCLUSIONS

The will to build dignified and truly human societies from respect for diversity, equity, social empowerment, cooperative work and complete participation is expressed in the subscription of the 2030 agenda by the representatives of the countries that belong to the United Nations. . Although the challenges are multiple and it is considered that all the objectives cannot be fully met in 2030, there is a global strategic projection that can allow administrations and citizens to know, value, share and act in this regard with their different levels of responsibility. .

The main objectives of this agenda focus on four dimensions: people, translated into their well-being in the broadest sense of the term, the planet from its knowledge and protection, prosperity in economic, technological and sociocultural

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growth, and alliances to strengthen international cooperation and promote a climate of respect and peace. In order to implement this way of doing and speaking the language of development, public libraries work in four major dimensions of action, which strengthen their role as entities of change and transformation, and position them as dynamic agents for an inclusive society. These spheres of action are recognized in this study as: open access and citizen participation; inclusion, cohesion, empowerment and local development; identity and memory; and sustainable spaces and actions.

Their own constitutive-social role characterizes them as spaces of interrelation, in principle, because they serve as a connection between institutions and local governments. A local development strategy involves all direct and indirect guarantors, and requires actions that ensure citizen participation in public policies based on sustainability. Public libraries, as part of the non-profit services of a society, have a fundamental weight in its construction and development, as they are entities for everyone. From public libraries, information services and products are implemented, collections are developed, and spaces are designed for any citizen without distinctions.

In the international context, from the political will of nations for an equitable, prosperous and sustainable world, institutions such as public libraries, being equitable entities that are committed to development and social empowerment, generate a great impact through the processes of information literacy, enhance social cohesion and inclusion, and encourage citizen action in different directions; That is why they are considered ideal spaces to encourage and strengthen the complete participation of communities in the design and

implementation of strategies, projects and government initiatives in that direction. Public libraries constitute scenarios where communities can generate their own initiatives to promote local development and shape the future from the objectives of the 2030 agenda within the framework of the corresponding public policies.

Author contribution statement

All authors participated in the design of the research and its development; They also reviewed the writing of the manuscript and approved the version finally submitted.

Conflict of interests

The authors declare that there is no conflict of interest.

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Impact Of Differences Between Digital Natives And Immigrants In Teaching In Health Sciences: Systematic Review

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ABSTRACT

Information and communication technologies have generated transformations in the relationships between digital natives and immigrants; Therefore, they affect the teaching and learning process, since each one uses a different technological language. The objective of this article is to characterize digital natives and immigrants and identify the influence of the digital divide in the health sciences educational field. The method used was a systematic review of scientific articles published since 2014, in the EBSCO, Google Scholar, Redalyc, Science direct, Scopus and Pubmed databases between the months of August and November 2017. Of 850 publications found, 60 studies met the inclusion criteria. In order to reduce the impact of the difference between digital natives and immigrants in medical education, it is important to promote the permanent training of teachers in the use and proper management of new technologies, which allows the generation of pedagogical models and more interactive teaching strategies according to the needs of future health professionals.

Keywords: digital divide; digital immigrants; digital natives; informational competencies.

INTRODUCTION

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The rapid advances in science, technology and the influence of globalization on modernity, the advances, ease, flexibility and speed of the digital age make evident the development of new skills that influence both social and academic life. of those who are in direct contact with all these aspects. [1]

Prensky 's (2001) conceptual naming establishes a new nomenclature, which designates teachers as "digital immigrants" and students as "digital natives." Immigrants are those who have adapted to the use of digital media, usually already in their adulthood, and natives are those who have grown up hand in hand with technology with innate skills in the language of the digital environment. [2] Consequently, two different profiles emerge, [3] which establish a gap regarding conceptions, paradigms, visions, access, use and management of technological language. [2.4]

The new challenges in the educational process pose the use of information and communication technologies (ICT) appropriately through more modern teaching methodological strategies. [5] This requires training and continuous education for the development of skills and competencies in both students and teachers, [6] without leaving aside ethics, values and the construction of knowledge collectively. [7]

Therefore, it is necessary to characterize digital natives and immigrants in the educational field in health sciences and identify the influence of the digital divide, with the purpose of proposing proposals that allow reducing the differences between them and thus renew learning environments. that promote the emergence of a student-centered educational model appropriate for their new identity and academic needs, that prepares them for the future as professionals, and thus

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successfully participate in the knowledge and information society where they work.

METHODS

A systematic review of scientific articles was carried out in three phases. The first generally explored the Pub Med and Google Scholar databases, to investigate the feasibility of addressing the topic, based on the following questions that guided this study: How to identify the characteristics of natives and immigrants? How to specify the gap between natives and immigrants in health sciences? And how to overcome the existing gap in the educational field of health sciences?

A second search was performed in the EBSCO, Redalyc, Science direct and Scopus databases. The descriptors digital immigrants, digital natives and generation gap were used; The Boolean connector "AND" was used between them, which allowed more precise and rigorous results to be obtained.

Only articles with scientific rigor and published in indexed journals were included, which responded to the objective set out in the review, in English and Spanish, published from January 2014 to September 2017. The search was complemented with lists of references from relevant primary articles.

All those original and review studies included in the period from 2014 to 2017 that were in other languages and that had as their objective the analysis of natives and immigrants in the family, business environment and that dealt with the issue of cyberbullying, as well as articles focused on areas that did not correspond to the educational field of health sciences. Articles of reflection, opinion, review, discussion and editorial letters were discarded. After the initial search, 850 studies

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were found and 790 that were not relevant to the objective of this research were excluded. Finally, 60 articles were selected.

In a third stage, all the articles were read and grouped by subtopic attributes, which were defined by the keywords of each author and particularities of the thematic area. With this input, the results were triangulated and the articles were classified into two large categories of analysis, which included the category characterization of immigrants and digital natives, and the category related to the identification of the influence of the digital divide in the educational field of Health Sciences.

ANALYSIS OF THE RESULTS

CHARACTERIZATION OF DIGITAL NATIVES

The notion of digital natives encompasses several designations that emphasize the importance of new technologies in the lives of those included in them, such as the net generation, [8] to describe the first generation that grows up surrounded by digital technology in a natural way to their experience. everyday: millennials. [9] Likewise, Generation Einstein (Piscitelli), Generation Y, Generation I, among others. [10,11] The above demonstrates the need to identify these young people, with the purpose of taking advantage of the skills they have developed in the digital world and, at the same time, identifying their shortcomings for full and comprehensive development as future professionals.

Prensky (2001) [2] proposes the term digital natives as the first generation that has grown up with digital technologies, natives of the language of computers, video games, the Internet and computer experts. [11] In the words of *Herther* (2009), [12] are those who were born approximately after 1980, grew up hand in hand with

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technology, which they prefer to use to carry out their daily tasks, which is why they share, create, communicate, coordinate and They learn differently. [13]

They have a distinctive set of characteristics that they have apparently developed through immersion in digital technology during childhood and adolescence when neural plasticity is high. [14] These traits are evident because they work better when they are online, they have important visuospatial skills and the ability to integrate the virtual with the physical world. [15] They choose graphics instead of text; The image is the way they communicate and think. They also enjoy doing several things at the same time, which is why they consider themselves multitaskers; then they move from one task to another easily and pay attention to several things at once. [16]

They prefer random access and receiving information quickly through parallel processing with a strong need for instant response. They know what they want and increase their creative capacity through the skills they have acquired over time. [17,18] This is how they are empowered to use all the tools mediated by the Internet, with a high risk of getting carried away by entertainment and gaming; For this reason, they spend more time on these activities than on serious work. [17]

For this reason, digital natives have turned the Internet into a very important place for socialization through blogs and social networks where they can express themselves and participate by giving and receiving information. [19] In addition, they obtain a large knowledge base through the Internet and electronic resources, which allows them to be independent and with the ability to interrogate and validate the data they obtain. [19] In general, they are characterized by adopting changes in the

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way of communicating, informing and learning in accordance with the current technological revolution. [20,21]

However, not all subjects born on the dates that coincide with this generation have the traits that define it. To be a digital native you have to share a global culture, so it cannot be generalized when the age factor [19.17] is taken as a reference or when the same opportunities to access and use technology are lacking. Thus, after young people who have less experience in handling ICT, who belong to a socioeconomic context that does not allow them access and have had little impact on their lives, can be called "non-digital digital natives." [22,23]

CHARACTERIZATION OF DIGITAL IMMIGRANTS

They are older people born in the pre-digital era, before the 90s, they communicate correctly and according to spelling rules, and they follow instructions before performing a task. [6] Their mental traits are aimed at inductive-deductive analysis processes, step by step, and their learning is based on pre-acquired knowledge. [24]

Unlike natives, they adapt to the digital world when they are adults and learn a different language, a new culture and a different way of communicating. [5] *Prensky* (2001) [2] identifies them as the old or non-native generation, because they make use of technology in the frameworks and ways that reveal their non-digital roots. [2]

In their daily experiences, they edit a paper document, print a message, ask others to view a page from the computer instead of sending them the link, call and confirm whether a message has been received after having sent it, [2.5] solve a problem. problem at a time, they act based on deductive analysis, and knowledge is based on previously acquired knowledge. [12]

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The concepts of digital natives and immigrants can stigmatize difference; Hence, on some occasions, natives are considered young people who only use technology for their entertainment, so it seems that they are distracted and far from reality. Since they can read a text, listen to the teacher, and send a text message at the same time without losing concentration, it is assumed that they are not paying attention and are classified as poorly educated. [13,14]

From this perspective, immigrants are described as obsolete, since it is difficult for them to learn digital language; so they don't understand the natives because they don't share the same language. In either case, the conceptions of digital natives and immigrants are taken to extremes without allowing middle ground that includes those natives who cannot have access to ICT for different reasons and those immigrants who are entering the digital world [2] to somehow get closer to the language of digital natives.

DIGITAL GAP BETWEEN NATIVES AND DIGITAL IMMIGRANTS IN MEDICAL EDUCATION

At the university level, teachers can be designated as digital immigrants and students as digital natives, since each one has characteristics that allow them to be identified according to access and use of technology. [2] The differences between digital natives and immigrants are evident in what they do in their daily, academic and professional lives. For this reason, a gap arises between teachers and students, who differ in the way they think, act, communicate and process information, since they have their own learning styles and preferences. [25,26] Thus, the digital divide in medical education can be considered a new expression of inequality in terms of social, cognitive, and generational inequities. [27] At a social level, it generates

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exclusion and discrimination of students who cannot access the network because they do not have the possibility of having internet connectivity. [28] , [29]

The cognitive level reveals the lack of skills and competencies to handle technological innovations that add to the scarce pre-existing cultural capital. [30] Finally, regarding generational inequality in the educational environment, it is not established only by the date of birth and the characteristics of each generation, but rather by the impact and adaptation to new technologies. [31] Therefore, it refers to the limitations or possibilities to use the resources on the network and take advantage of the new opportunities they offer. [27]

In this sense, there are also differences between the teachers themselves, classified as digital immigrants, who further increase the digital divide. On the one hand, those teachers who have adapted to the digital process but still do not fully use the educational platforms; They believe that students should read textbooks and do not accept the use of computers or digital tablets during classes. [31,32] And on the other hand, teachers who do not want to enter the digital world; So, they are distant from the students, since they speak an ancient language not related to technology. They even continue to think that the most important thing is the master classes. That is why they fail to recognize the new interests of the digital natives to whom they teach. [2,30,33]

IMPACT OF THE DIFFERENCES BETWEEN NATIVES AND DIGITAL IMMIGRANTS

Students' expectations have definitely changed. They are totally different from those maintained by their teachers, especially in relation to the type of technologies available, the frequency of use, communication skills, the degree of personalization

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of learning and the digital quality schemes, interactivity or multimedia resources. [3.4]

Today's students are no longer the same people for whom the higher education system was designed, so it is important to take into account the probability of redesigning the educational systems and teaching processes proposed today. [14] Traditionally, the teaching provided by immigrants in health sciences is traditional, passive and slow; [4,13] Therefore, students become tired and impatient when they receive lectures that do not motivate them or arouse interest, which does not allow real and meaningful learning. [twenty]

Prensky and *Anderson* (2009) [35] specify that students think and process information in a very diverse way, since they use a different digital language than their teachers, who were not born in this environment and have had to adapt, which implies that The educational system designed for the training of natives is not the most appropriate.

Students prefer to learn in a playful way in their educational experience, they master the contents of the future and use technology to actively control their online learning environment. [21,22] Their learning techniques are developed through the network and with the network, they have a capacity for constant updating and their progress is through exploration. When they use interactive media they have a high attention span. [27] This implies how distant the digital native is from the traditional source of knowledge; that is, the book, since the curriculum is based on the reading of books, articles and research reports, it does not allow true communication between natives and immigrants. [24,33] In this scenario, students are connected to the network and obtain information quickly and renewed compared to disconnected

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teachers, which generates instability, where teachers with a lack of technical and didactic security in the use of ICT emerge. because they have not developed the appropriate skills focused on pedagogical use that offer the security they require. [36]

So far, two types of content that must be taught are recognized: inherited content, which implies the traditional and includes reading, writing, arithmetic, logical thinking, understanding of texts and ideas from the past; and the content of the future, which corresponds to the digital and technological; the two necessary to generate the profiles of the professionals that society needs. [37] Therefore, education for digital natives should not be directed to a linear-temporal logic, but rather in a procedural manner, in which concepts are explained in parallel to how they are conceived in the real world. Likewise, immigrants have to promote a participatory culture where the student is the protagonist of their destiny, and begins to make decisions and actions directly related to their context and professional training. [35] However, it must be considered at an educational level that native speakers, due to their multitasking capacity, have lost the level of productivity, the ability to concentrate and long attention spans, since they want to change quickly from one topic to another, so, In many cases, the information they obtain is superfluous due to the fact that they open the greatest number of communication channels or online jobs without achieving a high depth of knowledge. [38]

It must be taken into account that they cannot be considered experts in the management of digital technology, since the low contribution and participation in wikis, blogs or educational platforms has been seen, as well as the low creation of relevant content in different social media. . [35] So they seek to prioritize their free time and spend less time learning, the use of the Internet becomes an insignificant

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tool for the daily activities they carry out during their study. [5,7] From this perspective, *Gallego-Lema* (2017) [39] calls young university students who do not have discipline, intellectual rigor and analytical skills "analog ignorant", because it requires greater concentration, dedication and effort.

Despite the large amount of information that students are faced with, even if they have high levels of skill in using the Internet and technological tools, their skills to perform tasks such as investigating, choosing, collecting, understanding, as well as organizing it, processing it and transforming it into learning, and subsequently into knowledge, are limited. [40]

CHALLENGES OF IMMIGRANTS IN HEALTH SCIENCES

Teachers of the 21st century face new educational challenges in a rapidly changing society, so they must experiment with other ways of teaching by integrating digital tools into teaching practice. [41] Thinking that there is no single teaching language applied for years and that it continues to transcend digital natives is a challenge that immigrants must take on. [42,43] In fact, it is the teachers who detect the differences and are interested in generating new learning strategies and other possible social uses of technologies to face these changes in medical education. [44]

The digital immigrant requires becoming an organizer of the interaction between natives and objects of knowledge; give students the opportunity through the design of learning environments with great informative, communicative and motivating potential in which they have initiative and generate active learning for life. [42]

In accordance with global trends in medical education and current problems, immigrants need to know the characteristics of their students, understand their needs and learning methods, in order to choose an appropriate environment to

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consolidate and evaluate knowledge and know-how. by allowing them to be protagonists of their learning. [45] In the same way, they must stimulate self-regulated learning that allows the student to be proactive, be self-motivated and use the strategies that allow them to achieve the desired academic results. [46]

For immigrants in medical education to learn to teach with ICT and improve their role in the training of professionals [47] they need the acquisition and appropriation of informational competencies to know, learn and apply these technologies, in order to design the objectives of the course, define the learning contents, teaching strategies and the evaluation of the acquired knowledge, all mediated by technological tools. [48]

Being able to master these types of computer skills is what is described as "digital literacy." [49] These competencies are a set of knowledge, skills, attitudes and behaviors that allow both immigrants and digital natives to recognize when they require information, where to locate it, how to evaluate its veracity and thus communicate it appropriately according to the problem posed. [50] In this perspective, strategies are proposed, especially in the linguistic part, that generate new challenges, formats, updates and modifications of educational processes that allow for better education. [51]

DISCUSSION

There are no solutions or recipes for how to change the beliefs and perceptions of immigrants. It is basically a deep and dynamic cultural change that can occur day by day with the purpose of improving medical education. [28] Thus, the introduction of ICT requires pedagogical models that motivate both teachers and students to

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achieve academic success [52] and that through the use of strategies, training in values such as respect and commitment is achieved in future professionals. . [53]

The social, cognitive and generational inequalities that underlie the gap can be counteracted by implementing strategies for gradual and evolutionary digital inclusion. Likewise, digital natives and immigrants have to acquire informational skills that allow them to develop other transversal skills in order to improve the teaching-learning process. [54] The quality of the use of technologies must also be improved. If necessary, reforms of medical education should be planned, at a pedagogical level, to make them coherent with the new educational resources and means provided by these technologies. [55]

Immigrants in medical education should be expected to be willing to use technology to teach; use simulation and augmented reality techniques to make the most of the educational process, in order to achieve a greater connection with their students. [56] From this perspective, the virtual modality allows relevant changes in the way of acquiring knowledge and developing clinical skills, and also continuous professional training for life. [57] For this reason, health sciences faculties, in the search to improve the teaching provided by teachers, generate academic spaces for their training with continuous training at affordable times on topics that promote the use of ICT for greater effectiveness in teaching. implementation of these in the classroom. [58]

It is essential to design a new curriculum that considers the good use of technology with the purpose of creating dynamic learning environments that are intuitive and accessible to the student, that facilitate communication and are focused on new

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active teaching-learning models adapted to native speakers. digital through the social construction of student-centered knowledge, with the teacher as mediator. [59]

In this order of ideas, the health sciences teacher needs to stop along the way, reflect and become aware of the challenges and implications of training future professionals. For this, they must focus their efforts on finding alternatives that motivate them towards a change in attitude towards the implementation of ICT in the teaching-learning process, taking into account the educational context, the competencies to be developed and the curricular design in search for the profile of the health sciences professional that today's society requires. [60]

FINAL CONSIDERATIONS

Health sciences students can be considered digital natives, since they have special characteristics of a generation differentiated by the use of technological advances, they prefer to receive information instantly, read in a digital medium, they like parallel work and multitasking, they have the logic of hypertextual thinking, a graphic language, they work on a network and prefer random access. Furthermore, their source of knowledge is the Internet, and not books, and likewise, when they use interactive media they have a high attention span.

Although these digital natives have high levels of skill in using the network and technological tools in the social sphere, it cannot be concluded that they have the same ability to use them in the academic environment. As for the teacher described as a digital immigrant, he is characterized because he has incorporated technologies into his life late and considers the Internet his second source of information, which is why he prefers print to be able to read.

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The differences between the teacher and his students are evident; That is why there must be a common language and style between them that allows for more fluid communication for an optimal teaching-learning process. For this reason, the immigrant has the challenge of recognizing from the beginning the characteristics of his students to provide them with didactic strategies and educational models that favor greater academic success. Likewise, in medical education, both natives and digital immigrants need to acquire informational skills that allow adequate use of ICT, which implies ensuring appropriate implementation of these in the curricular contents and, therefore, the improvement of teaching practice. everyday life when planning appropriate digital tools for the construction of meaningful learning.

It is necessary to invest efforts in the design of non-traditional pedagogical models and in innovative teaching materials that support teaching and learning. Therefore, we must delve deeper into a procedural logic, in which concepts are explained in parallel to how they are conceived in the real world. On the other hand, it is crucial to teach both inherited knowledge that involves the traditional and includes reading, writing, arithmetic, logical thinking, understanding of texts and ideas from the past, and future content, which corresponds to the digital and technological. . Both are necessary to generate the profiles of the professionals that society needs to train.

It is important to develop future research that contributes to resolving questions about how to use play in the classroom to encourage the participation of digital natives, and how to articulate study programs that allow the student's direct relationship with the text. Also, guarantee that both digital natives and immigrants develop informational competencies with emphasis on the development of

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communication skills and critical and reflective thinking about information. Finally, the capacity for multitasking in digital natives must be explored in depth in order to allow continuous improvement in their learning.

Conflict of interests

The authors declare no conflict of interest.

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