Analysis of techniques and technologies of Latin American teachers and scholars in the educational context: a systematic review of studies conducted between 2004 and 2021

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Abstract

Objective: to analyze the techniques and technologies of Latin American teachers and scholars in the educational context between 2017 and 2021. Methods from the search in the databases BIBLAT Bibliografía Latinoamericana, DE GRUYTER and DOAJ from 2017 to 2021 with the intention of knowing the approach to techniques and technologies in relation to the school community, transits city region, region city. Studies that enunciate technique and technology in the educational framework were taken into account, specifically community school and city region. They were recorded in the bibliographic documentary analysis matrix by means of the technical file. This review is oriented to the search for a path where the relationship between the school and the community is analyzed to enable situated learning, strengthening the dialogue of knowledge and the exchange with other experiences within the framework of the meeting of Latin American techniques and technologies. A meta-analysis of understanding of techniques and technologies in the educational context and pedagogical practices was carried out with students and teachers of different levels of training and knowledge. Results: 12,926 studies were included and 50 provided viable data for meta-analysis. In the reviewed studies, the technique is related to specific actions of a procedure with the intention of fulfilling a series of steps to obtain a result. Technology is situated in the perspective of student-teacher, teacher-educational community, student-community mediation in general, supporting the pedagogical and formative work of education at its different levels and pedagogical intentions. In general, 14 studies made it possible to understand the relationship between technique and technology with the school-community, 4 studies revealed the transit of the city-region. However, greater proximity with the participants is required to know the relationship that invites the use of techniques and technologies in human interactions. Conclusion: The findings indicate that techniques are related to procedures elaborated for the accomplishment of an intentional task, while technology is linked to the teaching process, to the communication between the actors of the creative act and the tools available to access and maintain the training process. The articles reviewed highlight the need for articulation by integrating school, students, parents, teachers and other actors involved in the teaching-learning process. This, given that it allows to contribute from an integral development, covering together determining aspects for their formation, which, when articulated, can be observed and covered in a preventive way. Aspects that have limited this articulation are also identified. In the city-region relationship, it can also be seen that the lack of dialogue is increasing inequality and isolating the regions by not actively participating in the strategies and discussions that the cities do carry out. This generates in the communities that receive their training in the region conditions of ignorance of trends, growth, use of technology, among others. Similarly, apathy is generated by

ancestral knowledge and community practices that fail to overcome their territory to be massified in the cities through the construction of common dialogues.

INTRODUCTION

Techniques and technology have multiple applications in education, in aspects such as pedagogical mediation and in the dialogue of knowledge. The functionality of technical assistance in the pedagogical framework integrates technological aspects, strengthening communities of practice and learning environments through teaching strategies led by teachers in the classroom (Bonilla-Santamaría, Ferra-Torres, 2021).

The need to open spaces to generate discussion in the face of the concern about the transits of the school and the community environment, are not long in coming and are revealed through the conflicts that arise due to the absence of spaces that tend to strengthen the relevant educational processes. Teachers are often confronted with family problems that students bring to the classroom on a daily basis, and that, despite knowing recent studies on how to deal with these circumstances without a direct intervention of the teacher, they must intervene and face from the pedagogical practices and their formative practices, alluding and explaining the circumstances in which students must face family, social, economic, labor and other problems.

These scenarios are expressed in the classroom or in technological spaces oriented to communicate, circulate and disseminate information, sometimes in an excessive manner, without applying a regulation or filtering process that manages to synchronize with the conscience when publishing personal life, massifying family problems to the school and from the school to the community with a high intimate and private content.

In particular, the usefulness of technology in the mediation of resources to strengthen the teaching-learning process and support the

teacher's work, promoting creative acts, pedagogical innovation and revolutionary practices is evident. However, there is a latent fear of misusing the potential of technology as a mediating strategy for teaching and learning through new languages and ways of interacting. This complicates the teacher's work by making the possibilities of using technologies for educational purposes without awareness and without meaning.

There is evidence that the use of technologies for educational purposes promotes relations between the school and the community, enabling efficient, timely and quality communication channels. It provokes dialogue at different levels among students, parents, the educational community and the community in general, the municipal, governmental and local entities of the territories that already have connectivity, achieved thanks to their interest in not allowing their young people and children to be isolated from these social and globalizing dynamics. Likewise, the policies of technical viability, infrastructure and community technology are a priority for development plans and government plans.

In the studies reviewed, the relationship between the school and the community is strengthened through environmental education as a scenario that promotes educational aspects associated with this topic. There is the presence of actors of the national policy that direct the guidelines to channel the efforts in the improvement and maintenance of the Colombian territory. Among these, the school environmental purposes promote actions that energize the educational community and the community surrounding the institution through strategies of convocation and integration of diverse representatives and social leaders in an environment of dialogue of knowledge of conservation for the environment oriented to

the municipal, regional and departmental development (Flórez-Restrepo, 2012).

Some studies focus on understanding the relationship between family, school and community with a view to focusing efforts on the fulfillment of educational programs and counteracting the social problems they face on a daily basis. The apathy and lack of participation of some key actors in the community lead to conflicts and dissipate effective communication that makes constructive dialogues viable (Castillo, García 2017).

Other studies focus their research proposals on incorporating technology for the benefit of training and the dialogue of knowledge of the communities based on the high satisfaction of users of virtuality and the use of technological platforms (Villaroel-Quinchalef, Fuentes-Salvo, Oyarzún-Muñoz, 2020).

It is clear then the need to analyze the techniques and technologies used in the dynamics of the relationship between the school and the community, and the transition between city-region and city-region to understand the relevant use that can be made of resources and take advantage of knowledge and lessons that occur at different levels and that could strengthen the other.

Objectives

The general objective of this research is to analyze the techniques and technologies of Latin American teachers and scholars in the educational context through a systematic review of studies conducted between 2004 and 2021. The purpose of the project is achieved through three specific objectives:

First, to evaluate the perspective of techniques and technologies in the educational context between 2004 and 2021 in Latin America.

Second, to know its application or use in the different dimensions of pedagogy.

Third, to identify the characteristics that arise from the school-community relationship in the

educational context and the transits between city-region, region-city.

Methods

To carry out the analysis, studies related to the terms technique and technology in the educational context were consulted. An electronic search strategy was defined in the databases BIBLAT Bibliografía Latinoamericana, DE GRUYTER, DOAJ and EBSCO, to select articles during the period 2004 to 2021, using the following descriptors: technique - technology, school - community, city - region, region - city, School Community Technology, City Region Technology Education, Technical Technology Education, Technology City Region, and Education.

Table 1. *Relationship by Database where the search of the articles is performed.*

Row labels	No. Documents
BIBLAT - Latin American Bibliography	13
DE GRUYTER Social Science Journals	4
DOAJ	9
EBSCO	22
(blank)	2
Grand total	50

Note: Table 1 corresponds to the databases where the search for the descriptors with the highest prevalence of the concepts analyzed was carried out.

The following elements were evaluated: bibliographic reference, name of the document, key words of the text, type of publication, year of publication, electronic address or ISBN/ISSN registration of the text, country of publication, name of the author(s), central theme, area of knowledge, research category understood as. It also includes the main objective of the text, the approach or type of research, methodology of data collection, methodology of data analysis, summary of content and description of the contribution to

the research, results and conclusions, and the data base located. Finally, the studies were organized in Mendeley. The complete table with the description of the 50 sources is included as Annex 1.

Results

From the total search, 12,926 articles were shown, of which, 50 were relevant when analyzed by database, and are described as follows:

The result of the search and selection in the database BIBLAT - Bibliografía Latinoamericana were 5 articles with the descriptors Escuela-Comunidad of which 3 were relevant. For the descriptors education technology, 38 documents were found, of which 4 articles were relevant. For the descriptors technical education no articles were found and for city - region 19 articles were found, of which 5 were relevant.

In the GRUYTER Social Science Journals database, 36 articles were found under the descriptors school - Community, but only 3 were relevant considering the descriptors technical - technology. Regarding the descriptors city-region, 165 documents were found, of which 2 were relevant.

Finally, for the DOAJ database, 38 documents were found under the descriptors school community technology of which 9 were viable for the study, and 36 were found under the descriptors school technical community of which 1 was relevant for the study.

In the EBSCO database under the descriptors school community technology school, a total of 1 document was found which was not feasible to take into account. Under the descriptor school technical community 2,862 documents were found, of which six 6 were relevant for the study. Under the descriptors city region technology education, 6,552 articles were found, of which 1 was pertinent to take into account. For the descriptors technical technology education education technology, 2 documents were found, both of which were taken into account. Finally, for the descriptors technology

city region, education, 3,172 articles were found, of which 14 were included in the study.

The last three years have seen the highest production associated with this thematic, with 8 products in 2020, and 7 in 2019 and in 2021, corresponding to 44% of the chosen production. The description is shown in Table 2.

Table 2. *List of years of publication of the articles.*

Year	Quantity	%
2004	1	2,00%
2005	2	4,00%
2006	1	2,00%
2007	1	2,00%
2008	1	2,00%
2009	1	2,00%
2010	1	2,00%
2011	1	2,00%
2012	3	6,00%
2015	3	6,00%
2016	5	10,00%
2017	6	12,00%
2018	2	4,00%
2019	7	14,00%
2020	8	16,00%
2021	7	14,00%
	50	

Note: Table 2 corresponds to the years with the highest prevalence in the scientific production of the concepts analyzed.

The Latin American country with the highest production associated with this topic is Mexico with 28%, followed by Colombia with 24% and Argentina with 12%, as shown in Table 3. There is a shared product between Colombia, Chile, Mexico and Venezuela.

Table 3. *List by country where the articles are published.*

Row labels	Year	%
Total, general	50	100%
Mexico	14	28,0%
Colombia	12	24,0%
Argentina	6	12,0%
Brazil	4	8,0%
Chile	3	6,0%
Venezuela	3	6,0%
Costa Rica	2	4,0%
Latin America	1	2,0%
Colombia; Chile; Mexico; Venezuela	1	2,0%
Ecuador	1	2,0%
El Salvador	1	2,0%
Madrid	1	2,0%
Peru	1	2,0%

Note: Table 3 corresponds to the countries with the highest scientific production of the concepts analyzed.

Regarding the research categories, it is evident that there is a prevalence of studies of technology in the school-community relationship, analyzing the cases in context, but limiting their analysis to the reality lived by each experience, as shown in Table 4.

Table 4. *List by country where the articles are published.*

Row labels	publication
School - Community City - Region	5
Region - City	6
Technique - Technology	1
Technology - Technology - Education - city	2
Technique - Technology - School - Community	19
Technology Region - City	9
(Blank)	1
School - Community	6
Technique - Technology	1
Total, general	**50**

Note: Table 4 corresponds to the search combinations of the country descriptors with the highest prevalence of the concepts analyzed.

Discussion

The main findings of the study allow evaluating the technical and technological perspectives in the educational context during the period 2004 - 2021 in Latin America, emphasizing the scope of the study from a multilevel logic between School - community and Region - city. In general, there is a prevalence in seeing technology as a key mediator of the teaching-learning process, of the communication between school and communities, and the approach of the city-region-city region.

In terms of technology, some challenges are identified in the transformation towards digital technology, such as the necessary articulation between public policies that improve access, provide physical equipment, and train teachers; the improvement of research lines and processes that allow a conceptual, epistemic and methodological body that sees the processes of digitization and access to technology from its understanding, not only its use; leading this to define a relevant implementation strategy (Caballero, 2009). It is clear that this reveals the challenges that must be faced both at the regional level, where local governments and educational institutions must establish dialogues that allow this scenario to take place and meet the aforementioned parameters, in addition to an exercise of articulation between the levels studied.

Understanding technology as a new way of thinking (Caballero, 2009), and recognizing the student as a digital native who uses current media in his communication process with other students and with teachers in the world, forcing the teacher to make use of these resources and be a guide that facilitates learning (Olguín-Moreno, Vargas-López, Rueda-Puente,

Rossetti-López & Vargas-Ramírez. 2018), it is interesting to find studies that already since 2004 discuss the way in which they should implement these technologies, whether it is from a massification of content to replicate massively with a low-cost logic, or it is from a creation of strategy with extensive multimedia interactive networks despite the cost that it may reflect (Romo, 2004).

This discussion still prevails in 2021. Institutions are analyzing in a post-pandemic which strategy to implement, whether to take advantage of the lessons and multimedia material created to promote virtuality and the full use of technology as a mediator in the educational process, or to return to the traditional techniques of face-to-face and synchrony with an emphasis on personal accompaniment. Implementing technology in education in a relevant way implies a preparation and transformation of curricula and teaching practices to achieve the development of the expected competencies and the use of strategies and tools that attest to their mastery and respond to the particularities of the students (Luna de la Luz & González-Flores, 2020), clearly highlighting the importance of the context and local realities in this design process. It is also relevant to include competencies associated with the use of technology as described by Segura-Azuaraa, Eraña-Rojasa & López-Cabrera (2019) who describe the competency of ICT use, which has as "indicators of mastery of this skill the management of information, orderly administration and use of the computer as tools for expression and communication" (p. 71). It is clear that, in this context, there are communicative exchanges where users also assume a role of content generator, establish interactions and foster communication and collaboration (Mapelli, 2019).

For this design, it is relevant to observe experiences such as multigrade in terms of the advantage of collective work and training outside the classroom with different new school type strategies (Mejía, Olvera, Argándar, Arruti & Estrada. 2016) or environmental education as an instrument to promote the different dimensions of the human being and its integration towards community scenarios (Flórez, 2012) to be included in the design that the opportunity to include technology generates. The inclusion of this technology also requires "enabling the study of the relationships between the different modes (oral, written, image, etc.) (...) as a (multi)modal continuum" (p. 92), which implies adjusting the technique of education to the new tools and realities, and the way in which it determines the teaching-learning relationship.

At this point, it is important to mention the discussion regarding the school-community or city-region level, as a way of identifying formative relevance. Pérez & Cárdenas (2020) describe the importance of community education as a "way of rescuing the cultural expressions of native peoples and the defense of territories" (p. 245). These initiatives may be at risk due to the misuse of technology and the need to create a way in which these resources promote local knowledge and not only massify concepts and agreements on pre-established knowledge. This can occur through processes such as the dialogue of knowledge for the appropriate use and exploitation of the potential of technology (Villaroel-Quinchalef, Fuentes-Salvo, Oyarzún-Muñoz, 2020).

Regarding the techniques and technologies used by teachers in the context of education, there are studies that show how teachers have used digital tools in their process, but the centralizing profile still prevails in their strategy (Martins, & Silva, 2016), preserving vestiges of the traditional model and thus limiting the implementation of techniques that lead to a better use of technology. Added to the absence of works oriented to techniques and the adjustments that occur in these, in the Latin American context, this confirms the importance of research in this topic, as a way to promote the updating of education towards the 21st century, but without leaving its role of articulator to promote development and multilevel dialogue in countries such as Colombia.

Finally, some works refer to the importance of opening up the regions in their education process. Villasenin (2021) states that Latin

America has a great potential to cooperate with China in the 21st century, both in the productive, industrial, logistic and agricultural aspects, among others. In this context, education in the region forces to seek bridges that allow access to this knowledge in a global village logic, which can be mediated by technology to incorporate this knowledge and opportunities. Finding only 9 studies that speak of the relationship between the Region and the city opens the doors of discussion to raise these scenarios with a view to the challenges of the 21st century for the Latin American region.

Conclusions

It is clear, according to the study, the importance of discussing the inclusion of technology and the opening of educational processes in the region in terms of teachers' techniques. The trends lead to the use of devices and tools, even more so with the pandemic experience, which is a topic of great interest in Latin American research. But it has led to an analysis of the benefits and detriments of its use, and the way in which technology is promoting communication.

Regarding its application in the pedagogical dimensions, there is no clear line of research that leads to reflect on how to develop the teaching-learning process mediated by this technology. There are some reflections and analysis of cases, which, being a very good work input, is still limited.

Finally, the studies demonstrate the importance of improving communication and relationship processes between the region and the city, but many of them propose models and proposals that can negatively affect the region, since they are oriented to standardization and massification of repetitive practices, not to the development of their own models that recognize diversity and local realities. This becomes an opportunity to generate knowledge and guide the region so that, from the territory, it can use digital mechanisms and tools to publicize its work and promote ancestral knowledge for collective benefit in the framework of a global village.

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