

The design of pedagogical technology and the staff formation as central elements in education, mediated by ICT

El diseño tecno-pedagógico y la formación docente como elementos centrales en la educación mediada por TIC

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Abstract

It is unquestionable that during the last decades the use of ICT has increased in the education field, this driven by the dictated policies through organizations such as UNESCO, that promote the importance of innovating the teaching process, improve learning, to democratize education and for students to acquire the skills that the actual and future workforce will demand from them; Nevertheless the health contingency caused by COVID-19 that forced schools to transition from in person instruction and a hybrid to an online model, it demonstrated several shortages and problems. For example, the lack of technological equipment, the limited connectivity to the internet, the training of faculty for the design and administration of virtual classrooms. With that said, the following article covers the design of pedagogical technology and staff formation, as central elements that allow the interests of an institution that decides to incorporate the use of technology to the education process and the results it obtains; Therefore, so looking for the vivid experience during the last two years, let it be the starting point to take advantage of a better manner the implicit potential that technology has to optimize the educational process.

Education, ICT, Use, Design of pedagogical technology, Staff formation

Resumen

Es incuestionable que durante las últimas décadas el uso de las TIC se ha incrementado en el ámbito educativo, esto, impulsado por políticas dictadas por organismos como la UNESCO, que promueven la importancia de innovar los procesos de enseñanza y mejorar los de aprendizaje, democratizar la educación y que los estudiantes adquieran las competencias que les demanda el mercado laboral actual y futuro; sin embargo, la contingencia sanitaria ocasionada por el COVID-19, que obligó a las escuelas a pasar de modalidades presenciales y mixtas a una modalidad en línea, evidenció diversas carencias y problemas, como la falta de equipamiento tecnológico, de conectividad a internet y de capacitación del profesorado para el diseño y administración de aulas virtuales; en este sentido, en el presente trabajo se habla del diseño tecno-pedagógico y la formación docente, como elementos centrales que permiten alinear los intereses de una institución que decide incorporar el uso de tecnologías a los procesos educativos y los resultados obtenidos; lo anterior, buscando que la experiencia vivida durante los dos últimos años, sea el punto de partida para aprovechar de una mejor manera el potencial implícito que tienen las tecnologías para optimizar los procesos escolares.

Educación, TIC, Uso, Diseño tecno-pedagógico, Formación docente

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Introduction

Today more than ever it is clear that information and communication technologies play a central and indispensable role in the development of society; they have modified the way in which people communicate, produce, share and access knowledge, work, and even spend leisure time; However, their incorporation and use in the educational environment has encountered a series of difficulties related to the lack of economic resources of schools, teachers and students to access them, keep updated, have internet connection, digital literacy and resistance to change, among others, This has been aggravated in the last year by the health contingency caused by COVID-19, which forced education systems to abruptly switch from face-to-face and mixed modalities to an online modality, and which has resulted in a greater impact on the most vulnerable, increasing dropout and failure rates.

In this sense, the document offers a referential framework for the construction of a techno-pedagogical design, understood as a set of technological tools made available to teachers and students, accompanied by an explicit, global and precise proposal on the best way to use them; and a comprehensive teacher training program that, under a collaborative model, considers the so-called categories of the knowledge base, understood as the common places that provide a basis for teachers to ensure success in the teaching-learning processes.

The proposal presented here is based on the policies and guidelines that UNESCO has been dictating since the end of the last century and that emphasize the importance of using ICT in education, to democratize access to schools, improve teaching-learning processes and prepare students for the labor market to which they are destined, but also, based on the impact caused by the health crisis we are experiencing, which puts at risk not only Sustainable Development Goal 4, related to quality education, but also the access to education as a fundamental human right and the exercise of other rights for which it is an enabler, threatening to become a generational catastrophe, by causing a setback in education worldwide.

Education and ICT

According to UNESCO (1998), information and communication technologies were the instruments that modified knowledge in society, making it possible to increase productivity and consequent economic development. This generated high expectations about what could be achieved with their incorporation into education, in addition to considering it as an unavoidable issue to innovate teaching processes and improve learning processes, democratize access to schools and ensure that students acquire the skills demanded by a new labor market, where technological tools play a predominant role.

In this sense, UNESCO has made multiple and constant efforts to influence the world's education systems, beginning with the World Declaration on Higher Education in the 21st Century (1998), based on questions such as: what kind of education do we want? and for what kind of society? whose objective was to establish the principles that should govern the reform of higher education systems. The declaration was based on the idea of the existence of a global, complex and changing society, where education must contribute to building peace, based on a process of development, equity, justice, solidarity and freedom.

The work of this Conference was organized into three areas and four debates in each, the first being: higher education and development; higher education, culture and society; and, new trends and innovations in the field of higher education, where, as can be seen, in the third area great importance was given to technology-mediated education, and the debates were on: higher education for a new society; from the traditional to the virtual; higher education and research; and, the contribution of higher education to the education system as a whole, determining that:

At the dawn of the new century, there is an unprecedented demand for higher education, accompanied by a great diversification of it, and a greater awareness of the fundamental importance of this type of education for socio-cultural and economic development and for the construction of the future, for which the new generations must be prepared with new skills, knowledge and ideals (UNESCO; 1998: 19).

In general terms, UNESCO proposed that countries modify their education systems and introduce policies to enable their schools to build networks and exchange experiences; create pedagogical environments capable of bridging distances, favoring social and economic progress; take advantage of ICTs for educational purposes; adapt technologies to national and local needs; facilitate the identification of objectives and interests of countries, as well as equitable access to technological infrastructure; follow the evolution of the knowledge society to ensure quality and equitable access rules; and, taking into account the potential of ICTs, consider that it is the schools that should use them to modernize their work, and not vice versa.

The World Declaration on Higher Education in the 21st Century was followed by various documents to guide academic work in the new century, including a planning guide on information and communication technologies in teacher training (UNESCO; 2004), which, although based on the idea that ICTs have had a profound impact on teaching and learning, transforming the way in which teachers and students access knowledge and training, at the same time recognizes that in order to effectively take advantage of the potential of new technological tools, essential conditions must be met, such as:

- Students and teachers must have sufficient access to digital technologies and the Internet in classrooms, schools and teacher training institutions.
- Students and teachers must have at their disposal educational content in digital format that is meaningful, of good quality and that takes into account cultural diversity.
- Teachers must have the necessary skills and knowledge to help students achieve high academic levels through the use of new digital resources and tools (UNESCO; 2004: 13).

The proposal thus highlights the importance of understanding the impact of technology on society and its repercussions on education, of considering the context for the integration of technologies in schools, of developing standards in teacher training, of following up on the stages of teacher development and the competencies they must acquire, and of generating student-centered learning environments (UNESCO; 2004).

In the same sense, the work Towards Knowledge Societies (UNESCO; 2005), insists on the leading role that technological innovations have played in society and their potential in the educational field, stating that:

"The radical changes brought about by the third industrial revolution - that of the new technologies - have in fact created a new dynamic, because since the middle of the twentieth century the formation of individuals and groups, as well as scientific and technological advances and cultural expressions, have been in constant evolution, especially towards ever greater interdependence. (UNESCO; 2005: 5).

But, notwithstanding the change mentioned, the work also recognizes that achieving a public sphere of knowledge is still an unfulfilled ideal, where ICTs and the Internet seem to open new perspectives for the expansion of the public space of knowledge, questioning whether the means are already in place to allow equal and universal access to knowledge, as well as a shared use of it, as a human right, considering that: "This must be the touchstone of authentic knowledge societies, which are sources of human and sustainable development" (unesco; 2005: 17). (UNESCO; 2005: 17).

Finally, within the framework of the educational reform proposed by UNESCO since the end of the last century and in the first decade of the current one, which seeks to develop new skills in students, supporting their social and economic progress, the work called ICT competence standards for teachers (2008) stands out, with the following objectives:

- To develop a common set of guidelines that professional training providers can use to identify, develop or evaluate learning materials or teacher training programs for the use of ICT in teaching and learning.

- Provide a core set of qualifications that enable teachers to integrate ICT into their teaching and learning activities in order to enhance student learning and optimize the performance of their other professional tasks.
- To expand the professional training of teachers to complement their skills in pedagogy, cooperation, leadership and innovative school development with the use of ICT.
- Harmonize the different ideas and vocabulary related to the use of ICT in teacher training (UNESCO; 2008: 4).

In this regard, it is important to mention that this document is a proposal addressed to decision makers in educational institutions, with the purpose of working both in the construction of curricula, or in their updating, to adapt them to reality, as well as in the offer of courses that allow teachers to prepare themselves for a new educational context, which will help their students to acquire the skills required for their professional training.

The above is part of the work carried out by UNESCO in the field of education and through which it aims to influence most countries to incorporate ICT into their education systems, and where progress is recognized, but also shortcomings and major challenges, having so far extremely varied results due to multiple factors, such as the economic capacity of schools, teachers and students to access updated and appropriate technological tools, digital literacy, availability of appropriate educational content, precise and concrete policies and guidelines on the objectives pursued and even the school culture and resistance of its actors to change, even more so, in the conditions we have been living in for almost two years, due to the health contingency caused by COVID-19, which has put schools around the world to the test, as discussed in the following section.

Education and COVID-19

While it is true that the world's education systems have recognized the importance of using ICTs in the teaching and learning processes, it is no less true that the health emergency we have been going through since the end of 2019 has shown that neither schools, nor teachers and students were prepared to move from face-to-face or mixed modalities to an online modality, as shown by studies conducted by the UN, UNESCO and ECLAC.

Education during and after COVID-19. United Nations Policy Brief.

According to the UN (2020), the health contingency caused by COVID-19 has caused the world's education systems the greatest disruption on record, leading schools to implement an online modality, affecting almost 1.6 billion students in more than 190 countries, aggravating pre-existing disparities by reducing opportunities for the most vulnerable. It also highlights that the losses in terms of learning may extend to the next generation, leaving behind the progress achieved in decades, as almost 24 million students are at risk of not having access to school or dropping out due to the economic problems caused by the disease.

This becomes relevant when we look at the differences between developed countries and those where their populations have barely enough to subsist.

A relatively small number of countries are tracking the actual extent and use of distance education modalities. However, projections show variable coverage: in high-income countries distance education reaches 80-85%, while that figure drops to less than 50% in low-income countries. This deficit can largely be attributed to the digital divide, given that the disadvantaged population has limited access to basic household services, such as electricity; a lack of technological infrastructure; and low levels of digital literacy among students, parents and teachers (UN 2020: 13, 14). (UN 2020: 13, 14).

Notwithstanding the above, some positive aspects have been identified, which should be worked on with greater emphasis, recognizing that the current situation has stimulated innovation by resorting to various technological means in schools to maintain communication and develop distance education solutions. The essential role of teachers has been recalled, which is considered to be inseparable from quality education, without leaving behind the most vulnerable, which depends on students having an enabling environment and resources to access learning, as well as teachers having better training on the educational methods required today.

Thus, in the face of uncertainty about the return to face-to-face classes, and considering that the right to education is a fundamental human right, and at the same time enabling of others, the UN (2020) proposes the following:

- Reduce transmission of the virus and plan thoroughly for the reopening of schools.
- Protect education financing and coordinate to achieve results.
- Create resilient education systems for equitable and sustainable development.
- Respect education and accelerate change in teaching and learning.

The call is, then, to make education a priority, both for governments and for the world's education systems, to prevent the current crisis from becoming a generational catastrophe that puts at risk the human right of access to education, and other rights that depend on it, being necessary to work on proposals that contribute to the fulfillment of Sustainable Development Goal 4, called Quality Education.

Education in time of the COVID-19 pandemic. COVID-19 Report. ECLAC-UNESCO.

In the same sense as the UN, ECLAC and UNESCO, in their COVID-19 report (2020), state that the pandemic caused by the SARS-COV-2 coronavirus has provoked an unprecedented crisis, leading to the massive closure of schools, affecting more than 160 million students in Latin America and the Caribbean. This will increase the gap between those who can access distance education and those students from countries and regions with lower incomes, especially those living in rural areas, where indigenous people and migrants also tend to live.

The report also states that in the face of the crisis being faced, the main measures have been the suspension of classes; and, as a consequence: "the deployment of distance learning modalities...; the support and mobilization of educational personnel and communities, and attention to the health and well-being of students" (ECLAC-UNESCO; 2020:1).

In this order of ideas, the document in question focuses on two issues: on the one hand, to make visible the consequences that these measures will have, and on the other, to make recommendations to cope with the impact, projecting areas of opportunity to innovate education and improve learning.

As consequences, there is talk of a direct impact on the academic training of students, noting that while it is true that governments have made significant efforts to give continuity to educational processes through the use of ICTs, considering that they have access to multiple pedagogical and knowledge resources, it is no less true that the countries of Latin America and the Caribbean have made significant efforts to improve the quality of education through the use of ICTs. It is no less true that the countries of the region were unequally prepared to face the problem, since significant gaps persist in access to the digital world, both in schools whose resources are insufficient to keep them up to date, and in homes, where the main device for connecting to the network continues to be the mobile phone, with the limitations that its use in the school environment entails.

However, as areas of opportunity to lessen the impact of the current crisis, the importance of adapting the evaluation processes is mentioned, which has to do with the monitoring of learning, evaluation and feedback, in order to know what has been the progress of students and, based on this, make decisions and carry out actions to improve for their benefit; It also refers to the need to support teachers and principals, who have played a central role, responding to emerging demands, re-planning and adapting teaching-learning processes, adjusting methodologies, reorganizing the curriculum and designing subjects and diversifying the means, formats and work platforms; finally, it also mentions the need to prioritize vulnerable groups, that is, to guarantee an inclusive, equitable and quality education, with learning opportunities for all and throughout their lives.

According to ECLAC and UNESCO, the crisis being experienced in all social spheres, and especially in schools, should be a turning point to:

"rethink education, giving priority among the new contents to preparing students to understand reality, to live and act in times of crisis and uncertainty, to make decisions at the individual and family level, and to promote collective solutions to urgent challenges that contribute to the structural transformation of the world." (ECLAC-UNESCO; 2020:17).

Thus, taking into consideration the above-mentioned background, attention is now focused on the importance of techno-pedagogical design and teacher training as central elements in ICT-mediated education, considering that the current crisis should be the turning point that gives technological tools, in the educational field, the relevant role they should have had for many years.

Techno-pedagogical design and teacher training in ICT-mediated education

The purpose of this section is to present a proposal that contributes to achieve a better alignment between what educational institutions seek with the incorporation of ICT into teaching-learning processes and the results that are achieved, taking into account ideas such as the following:

"The fundamental argument for continuing to maintain a high level of expectations in the educational potential of ICT... is... their taking into consideration as tools for thinking, feeling and acting alone and with others.... This argument is supported... by the unprecedented possibilities they offer for searching and accessing information, representing it, processing it, transmitting it and sharing it" (Coll et al; 2011:84).

In other words, it is unquestionable that technological tools have great potential in the educational field and can become instruments that allow students to think, feel and act alone and with others, thanks to the possibilities they offer to access the information that exists on the network, but for this to become effective, it is necessary that each educational system in general and each school in particular, work on two central aspects, which are a techno-pedagogical design and a teacher training program, taking into account the needs of the context to which they correspond. The following are reference frameworks that guide the work to be done.

Reference framework for building a techno-pedagogical design

To speak of a techno-pedagogical design is, first, to recognize that ICTs have become indispensable tools for the realization of the educational act, and that they have the potential to innovate teaching processes and improve learning processes; and second, to offer a proposal on the best way to use them. The concept is as follows:

"Proposals for incorporating ICTs into formal and school education generally take the form of a techno-pedagogical design, i.e., a set of technological tools accompanied by a more or less explicit, global and precise proposal, depending on the case, on how to use them for the implementation and development of teaching and learning activities. In their more complex variants, these designs include three groups of elements: a proposal of contents, objectives and teaching and learning activities, as well as orientations and suggestions on how to approach and develop them; an offer of technological tools; and a series of suggestions and orientations on how to use these tools in the development of proposed teaching and learning activities (Coll et al; 2011: 99). (Coll et al; 2011: 99).

In this order of ideas, there is no room for discussion on whether information and communication technologies should or should not be used in the educational field, especially taking into consideration that nowadays, and in the face of the health crisis caused by COVID-19, they have been the means that has allowed educational systems to stay on their feet and not stop the teaching-learning processes; However, what is subject to discussion, and should be addressed, is the lack of concrete proposals on how to do it, considering the particularities of each school, such as the academic model, the educational modality, the environment, the needs of teachers and students, and the culture that governs them.

This makes it necessary to take into consideration three issues:

First: The contents, objectives and teaching-learning activities, and the way to approach and develop them. This element is directly related to the role of teachers, and its importance lies in that it leads them to reflect on the place of a learning unit within the curriculum of the educational program to which it corresponds and how, or to what extent, it contributes to achieving the students' graduation profile; this implies a detailed study of the contents to be addressed, the objectives to be achieved and the most appropriate activities to achieve them; that is, knowledge of the discipline and mastery of teaching work strategies.

Second: Technological tools. This aspect, on the other hand, is related to the administrative decisions made by school authorities, and refers to the set of technologies offered to teachers to carry out activities; these tools must be designed according to the needs of the academic model, educational modality, context, teachers and students, international and national trends, and the challenges faced by ICTs themselves.

Third: Guidelines on how to use ICT in school activities. Once the first two elements have been covered, the institution should not forget to guide teachers on the most appropriate way to use technologies, an element that is related to the administrative authorities and the teacher training area, who are responsible for the design of policies and guidelines for the implementation of an online modality; these guidelines are essential to ensure the success of the work of teachers and students.

Based on this, it is essential for each institution to work on a comprehensive proposal that guides teachers in their school work, taking into account the context and the students as the center of attention.

Reference framework for the development of a teacher training program

Now, the best way to complement the technological infrastructure and Internet access that a school can have, is the training of teachers, through a comprehensive program that allows digital literacy, but also that it is reflected in a better use by students, this, considering that:

Scientific and technical development, the rapid mutability of knowledge, new social attitudes, new professional challenges and the massive use of information technologies demand new ways of managing knowledge and new strategies for university teaching (Imbernón; 2008, in Cutti; 2012: 32). These demands for new strategies for university teaching focus attention on the figure of the academic and his or her pedagogical training, which is commonly conceptualized as teacher training (Cutti; 2012: 32).

According to the aforementioned authors, it has been the scientific and technological development of recent times, which has required new ways of managing knowledge, and with it, also other ways of promoting teaching and learning, especially at the higher level, focusing these changes in the figure of teachers, who are required to play a leading role inside and outside the classroom, since knowledge is no longer only produced in schools, but is part of other social dynamics, thanks to the use of various technological tools, such as smartphones.

Thus, in view of the global scenario, a basic issue to improve teachers' practices, through the use of ICT, is precisely the development of a teacher training program, understood as: "a formal and informal process, of professional preparation for the exercise of pedagogical praxis" (Cutti; 2012: 32), where academics become the focus of attention, and their training, from a systemic perspective, enters into a dynamic and permanent process in which they acquire competencies in the disciplinary, pedagogical and technological areas, in addition to other areas, which give it an integral character. It is a matter of helping teachers to break with traditional work schemes, to move on to others that allow them to ensure the success of their work, taking into consideration the particular needs of the context, of the students and of themselves.

In view of the above, it is imperative to work on a proposal for teacher training that, being comprehensive, allows strengthening the role of teachers and obtaining satisfactory results in terms of student learning, thus being able to achieve indicators that focus more on learning outcomes than on content, making a student-centered pedagogical model a reality. The training program should minimally consider the two aspects discussed below:

The categories of the knowledge base.

The first issue to be addressed in order to specify a teacher training proposal is what Shulman (2005) calls the categories of the knowledge base, which he identifies as issues that underlie the understanding that the teacher must have, so that students can build knowledge, the common places that provide a basis to ensure the success of the teaching-learning processes.

... the ability to teach revolves around the following commonplaces of teaching... A teacher knows something that others do not understand, presumably the students. The teacher can transform the understanding, the skills to perform, the desired attitudes or values, into pedagogical representations and actions... Thus, the teaching process necessarily begins in a circumstance in which the teacher understands what is to be learned and how it is to be taught. It then proceeds through a series of activities during which students are given specific knowledge and opportunities to learn (Shulman; 2005: 9).

The knowledge base categories proposed by the author are as follows:

Content knowledge. It contemplates the professionalization of the discipline mastered by the teacher, through participation in academic events. It is the basis for teaching in any career.

General didactic knowledge: It considers the strategies of class management and organization that transcend the subject; it is the knowledge and application of different teaching-learning models.

Knowledge of the curriculum: It refers to the mastery of the materials and programs that serve as tools for the teacher's job; the purpose is that the teacher locates, within the curriculum of the career in which he/she develops his/her practice, the subject on which he/she works; it also has to do with his/her training for the design and development of new curricula.

Didactic knowledge of the content: It deals with the relationship between the subject to be developed and the pedagogy, between the knowledge of a subject and the way to approach it; it is also the knowledge of the academic model and the educational modality.

Knowledge of the students and their characteristics: It has to do with the knowledge of the students, since only on this basis will the teacher be able to make the best decisions regarding the work methodology; it is a fundamental issue to ensure the success of the teaching-learning process,

Knowledge of the educational contexts: It considers the characteristics of the group, the management of the authorities and the place where the school is located; in general terms, all the aspects that forge the culture of the institution and that influence the teacher's work.

Knowledge of the objectives, educational values and their philosophical and historical foundations: This refers to knowledge of the general educational system and of the policies and guidelines that govern education.

In addition to the aspects proposed by the aforementioned author, it is essential for teachers to have knowledge in other dimensions, such as:

Knowledge of ICT: Initially contemplating digital literacy, but later understanding that these should be a means in the development of the teacher's work and not just an end.

Knowledge in research: In order to promote the analysis and transformation of their own practice, which will lead each teacher to enter into a process of continuous improvement, according to the needs of the school context.

Knowledge of tutoring: In order to be able to be a guide in the school environment, and to accompany the students' entry, trajectory and graduation.

It is important to point out that the categories of the knowledge base defined should not be considered or become a straitjacket for schools or their teachers; they are, as the author who proposes them refers, common places that it is convenient for teachers to know, master and apply, but each school must undergo a process of recognition of its needs and work on them.

A model for detecting training needs.

Now, regarding the way to detect training needs, it should be taken into account that a criticism of current educational systems is that most decisions are made at the central level, from where models created for other contexts are usually taken, and when implemented in places that have totally different conditions, they end up with unsatisfactory results.

Cutti (2012) states that an example of these policies is that educational institutions have forgotten about a transcendental activity such as the pedagogical training of teachers, giving priority to postgraduate studies; he adds that among the evidence of the lack of interest in the subject is: that training programs appear and disappear, teacher initiatives are subject to political and personal changes of those responsible for the programs, activities aimed at training are fragmented, repetitive and disconnected from the context, and there is no clarity in the vision pursued by each school, because while they promote teacher training, they do not demand it, value it and much less recognize it.

This background forces a paradigm shift, and to think about the existing models to detect training needs, which according to Font and Imbernón (2002), cited by Cutti (2012), are:



Figure 1 Training needs models, according to Font and Imbernón (2002), taken from Cutti (2012)

As can be seen in the diagram, while in the normative model the authorities of the institution are the ones who are considered to have the vision to discover the shortcomings of teachers and prescribe teacher training courses, in the collaborative model the starting point is the needs felt by teachers, since they are recognized for their ability to notice what they need to improve their practice, and they are allowed to create a map to identify shortcomings, relationships that exist between them and establish an order of priority to solve them.

From the above, it can be concluded that teacher training programs should be articulated from an inductive logic, starting from the identification of teachers' needs in each context, since they are the ones who can express what they really need to improve their daily work, as proposed by the collaborative model.

Conclusions

It is evident that the technological developments of recent decades have marked the course of modern society by considerably modifying production systems, but they have also generated large gaps between countries that have access to them and those that lack the most indispensable.

In the field of education, and despite the efforts made by UNESCO since the end of the last century to incorporate ICTs into schools, the results have not been as expected, since there is still a considerable gap between what is expected by educational systems and what actually happens, and their presence in schools continues to be, as Cuban (1993) states, peripheral and marginal.

Proof of the failure that has been, in many cases, the incorporation of ICTs in schools, is that by moving from face-to-face and mixed modalities to an online modality, due to the health emergency caused by COVID-19, not only has Sustainable Development Goal 4 "Quality Education" been compromised, but even the access to education as a fundamental human right, especially in the population from vulnerable groups, where dropout and failure rates have increased considerably, threatening to become a generational catastrophe.

In this sense, the current crisis is called to be the breaking point that modifies school practices, that is, education must no longer be what it has been until now, the world's educational systems must change once and for all, making effective the potential of information and communication technologies, which in other social spaces has been widely exploited. Learning environments must be built, where the teacher acts as a mediator and the student constructs knowledge; according to Bartolomé (2004), we must move from content analysis to the acquisition of competencies, from directed work to self-regulated learning and from information consumption to information management.

But achieving the above implies working on central aspects such as the construction of techno-pedagogical designs according to each context, as a set of technological resources available for teachers and students, accompanied by a proposal to use them, which guarantees the innovation of teaching processes and improvement of learning processes; and, in a teacher training proposal that, from a collaborative model, provides teachers with the necessary skills to work in the new reality we are facing.

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