

# EDUCATIONAL CYBERNETICS, ACTORS AND CONTEXTS IN DISTANCE HIGHER EDUCATION SYSTEMS

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## Cibernética educativa, actores y contextos en los sistemas de educación superior a distancia

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### Abstract

Distance higher education take on big challenges in pursuit of the update of technological mediations that allow processes to be carried out of interactivity and social interaction, as well as before recognition of actors and context for the sake of to encourage the development of specific general competencies required by new professionals to meet the environment needs. This paper presents the partial results of qualitative research, whose objective was in identifying the role of actors and the context in distance education systems, for the sake of improving educational processes and find alternatives to close gaps between vocational training and the labour supply. To reach the objective was to carried out documentary analysis and the contributions of educational cybernetics were assessed for the sake of systematically understanding the processes of social interaction an interactivity that are carried out in this educational model. As results was found that educational cybernetics makes it possible to recognize actors and contexts, because it provides clarity on the composition of the systems that are articulated when it comes to training future professionals. It is also considered essential to recognize actors as human beings linked to a specific context, in which they take on challenges to transform the economic and social system with their work.

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### Keywords

Distance education, cybernetics, actors, context, social interactions, TIC.

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### Resumen

La educacion superior a distancia asume grandes desafios en pos de la actualizacion de mediaciones tecnologicas que permitan realizar procesos de interactividad e interaccion social, asi como ante el reconocimiento de los actores y el contexto en aras de favorecer el desarrollo de las competencias generales y especificas que requieren los nuevos profesionales para dar respuesta a las necesidades del entorno. El presente articulo presenta resultados parciales de una investigacion cualitativa, cuyo objetivo consistio en identificar el papel de los actores y el contexto en los sistemas de educacion a distancia, en aras de mejorar los procesos educativos y buscar alternativas para cerrar brechas entre la formacion profesional y la demanda laboral. Para alcanzar el objetivo se realizo un analisis documental y se valoraron los aportes de la cibernetica educativa en aras de comprender de manera sistematica los procesos de interaccion social e interactividad que se llevan a cabo en este modelo educativo. Como resultados se encontro que la cibernetica educativa hace posible el reconocimiento de los actores y contextos, dado que brinda claridad sobre la composicion de los sistemas que se articulan a la hora de formar futuros profesionales. Asimismo, se considera fundamental reconocer a los actores como seres humanos de un contexto determinado, en el cual asumen retos para transformar el sistema economico y social con su labor.

### Palabras clave

Educacion a distancia, cibernetica, actores, contexto, interaccion social, TIC.

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## Introduction

The circulation and construction of knowledge in distance education systems demand changes in didactic and pedagogical designs, one of them focuses on the humanization of training processes, through the recognition of actors and contexts and the role they assume in social transformation. Each context presents its own particularities and requires critical professionals, human beings capable of innovating in their exercise and responding to specific and global problems. This is why recognizing the human being who is on the other side of the screen and the needs of the context to which it belongs is, without a doubt, the biggest challenge facing distance education, for its very mass-media characteristics. Seen this way, as Delgado (2011) puts it, technology-mediated education demands:

A permanent dialogue with the contexts where technologies are deployed. These contexts, always heterogeneous and social, involve a number of people and communities that are not part of the specialists, but without which the knowledge and practices that technology involves cannot be carried out in transformation actions (pp. 34-35).

In the technological era, the use of mass-media, social networks, and computer systems to carry out daily activities becomes indispensable. As Aguilar (2011) has stated, technology evolves and, in most cases, it does so to make people's lives easier. Wherever you look, there are advan-

ces and technological applications that serve to obtain information about what is happening in the world and how to operate in it. Education has assumed various challenges in order to favor training processes through cyber spaces. Among them, conceptual mobilizations in relation to what the classroom entails, the teaching and learning processes through virtual spaces, as well as the awareness of communicative processes since education is a social system that has as its base the use of language.

This paper aims to conceptualize the importance of the recognition of the actors and the context in the systems of distance higher education, in order to identify and analyze, through the contributions of educational cybernetics, the elements that articulate the training of professionals in the academy-business relationship to minimize the gaps between the educational offer and the labor demands. Recognizing the actors that interact on the other side of the virtual classrooms as human beings with their own needs, will also allow to humanize the processes of interaction through Information and Communication Technologies (ICT), improve the social interaction required in the construction of knowledge and identify the needs of its environment so that learning becomes useful when it comes to responding to the particularities of the context and thereby contributing to the sustainability of a territory.

For this purpose, in the first part, some of the phases and elements that have occurred in distance education will be briefly exposed; subsequently, the challenges imposed by the education of professionals in distance education systems in the XXI century are analyzed; in the third instance, the contributions of educational cybernetics in the recognition of actors and the context in distance education systems will be reviewed; the role of language in the processes of social interaction required for the interactive use of the mass-media will also be discussed. Finally, some final thoughts will be presented.

## Some phases of distance education

ICT-mediated education got pedagogical and didactic designers in a conundrum in its initial stages. In this phase, there was resistance presented by the actors —teachers, and students— to take the step from face-to-face education to an education in which space and physical contact disappeared. Digital literacy began then, as Torres (2000) and Trujillo (et al., 2011) put it well, to overcome the difficulties and fears that arose from the few digital competencies of the actors involved in the process.



In addition to digital literacy, the genesis of distance education involved a conceptual and methodological mobilization for educators and students. Conceptual to the extent that the classroom, teaching and learning resources and processes gained new meanings and uses. Methodological since in order to mediate and achieve processes of interactivity and social interaction in cyberspace, teachers were required levels of didactic innovation to achieve in-depth learning. This introductory phase of distance education led to the implementation of a model in which the central axis of the process, as stated by Milojevic (et al., 2013), was man-machine-information interactivity. A mechanical interactivity in which there were really no processes of social interaction since the didactic designs were instructional<sup>1</sup> and the technological resources were not taken advantage of given the early stages of development.

Given the shortcomings of the ICT-mediated educational model, in its first phase, review and reform processes of distance education systems were initiated, in order to generate processes of what Klement and Dostál (2015), Rost (2006) and Kiouisis (2002) called “social interactivity.” In which, technological mediations enabled, in addition to instruction, the exchange of information between the actors in the educational process.<sup>2</sup> For this phase, the figure “instructor” was changed to the figure “tutor”. The change implied greater closeness with the student, pedagogical and didactic designs in which there was feedback to improve the learning processes of the students. The tutor provided more support during the process. Processes that favor communication, interaction and interactivity, as Fainholc (1999) put it. However, in these systems, the objective was not the training based on the recognition of the other as a human being, but the specific education in which the mobilization of information was given through cyberspace.

The didactic designs in this phase of distance education had been reformed and allowed, through the use of technological resources, to account for the learning achieved by the student. At least this was evidenced by the thematic tests or evaluations programmed in the courses. The measurement of the competences was still incipient because the fact of giving an account of the concepts when answering the tests (questionnaires, forums and other activities) was not enough to demonstrate competence. This led didactic and pedagogical designers to think of new evaluation models for these systems.

A third phase in the design of distance education systems began decades ago. Educational cybernetics, based on the contributions of Stafford Beer (1974, 1982), led to the recognition that the nature of edu-



cational systems in cyberspaces lies in the human component. Given the complexity of its elements, educational cybernetics facilitates the analysis of information in the midst of complex systems, as García (2006) puts it. The role of human interaction is, then, recovered to interpret the complex systems and the information that compose it. Thus, the teacher's role made sense in the virtual and distance education system, and synchronous tutoring spaces appeared, in which the participation of the actors was valued. Pedagogical and didactic designs began to be thought to give primacy to the interaction between actors (teachers-students) and the role they play in the educational process.

In this phase, the man-machine-information-man turn began to favor social interaction through platforms and mass-media began to be better utilized. For its part, educational cybernetics allowed pedagogical and didactic designers to analyze and question distance education systems in order to plan educational improvement designs through science-technology-society-environment relationships (CTSA). In this phase, then, the circulation of information was mobilized towards the circulation of knowledge and the actors in the interactive process were intentionally linked.

Giving the actors greater strength over inanimate systems allowed teachers to reform course designs based on innovative processes that will lead their students to perform complex tasks using the acquired knowledge. This made it possible to start a process to overcome the instructional design that had been imposed for some decades.

However, in recent years it has been shown that technological models are constantly and rapidly evolving. The flow of information is increasing and the use of social networks has become a lifestyle for new generations, a way of approaching the world that ends up being unreliable. Therefore, it is urgent to think about new reform processes in which distance education assumes the challenges that science, technology, and society impose. Reason why, interactivity processes become insufficient to respond to the needs of the context, even if they are based on transactional models. Since, although they favor the recognition of the actors, they do not take into account the context to which they belong and their particularities. This, as stated by Zángara and Zans (2012):

The transactional distance model allows us to understand the phenomenon of mediated teaching as a communication space, in which the geographical or physical distance of teachers and students is not a fundamental element when planning and implementing a teaching proposal (p. 87).



But ignoring the distance falls into the error of ignoring the location of the other that interacts through the machine. The educational model is standardized to ignore geographical boundaries and with it, an educational program with the same characteristics is offered, for people who will work as professionals in diverse territories that demand answers to their particularities.

Now, thinking about a new model, as Lion and Maggio (2019) affirm, implies the contemplation of “contemporary scenarios that pose political, social, cultural, pedagogical, communicational and cognitive challenges” (p. 14). Thus, the training of professionals in distance education systems urges teachers to assume the obligation to innovate and challenge with the use of technologies to respond to the challenges brought by social needs, which “constitute a multidimensional and complex web in which a central feature has been the modification in the forms of production, circulation, and distribution of knowledge” (p. 14).

Higher education institutions are currently facing changing and dynamic environments that require faster and more adaptive responses to new scenarios. Therefore, it is essential to have strategic management tools that allow adapting quickly to the new demands of the context (Huerta and Pedraja, 2019, p. 5).

And distance education cannot ignore these contexts. Faced with this issue, the UN proposes distance education systems as set out in the ECLAC document, as a goal for the year 2030:

Ensure that all students acquire the theoretical and practical knowledge necessary to promote sustainable development, among other things, through education for sustainable development and the adoption of sustainable lifestyles, human rights, gender equality, promotion of a culture of peace, world citizenship and the valuation of cultural diversity and the contribution of culture to sustainable development, among other means (ECLAC, 2015, pp. 15-16).

A great challenge that involves thinking about formative processes in which the subject is recognized as an integral being, a being able to critically question reality in order to change it, to achieve the expected sustainability through the responsible exercise of his profession. For this, two elements become fundamental, among other things:

- *The recognition of the actors*, within the system, as human beings who interact socially in pursuit of the construction of knowledge.



- *Knowledge of the context in which they live*, as new professionals, must be able to solve the problems in their region to transform the environment and achieve sustainable development.

This challenge entails, as Torres (2000) puts it, a better use of ICTs within the context, as well as the suitability of the teacher so that, from the educational cybernetics, he brings his students closer to the recognition of their context and theoretical and practical knowledge that will allow him to develop as a competent professional and from his specialty, as Rosenblueth (2005) has proposed, to contribute to local and global transformations.

## Challenges of vocational training for the XXI century

In recent years, higher education has tried to respond to the needs that arise in context. To this end, it has undertaken a series of actions in order to make strategic alliances within the university, business and state triad. Establish relationships through policies that effectively articulate education and work, as proposed by Colom and Vilanova (2009), and work together towards the horizon of the Sustainable Development Goals (SDGs). Thus, the new challenges assumed by higher education are linked to social, political and economic needs. It tends to operate in a relationship of education offered in universities, which operates from the recognition of labor demand in the regions, to train professionals who are able to achieve, from their work, sustainable development in the environment in which they inhabit, as proposed by the Sub-commission on Vocational Training of the Technical Commission, the National Council for Work Education, the International Labor Organization and the Ministry of Education, (2001).

The economic and social impact of the technological revolution, the new ways of organizing work, the globalization of economies, the integration of financial markets, goods and services and labor; the impact of negative consequences in countries that lag behind; with its unemployment consequences that generate alternative occupational initiatives; given the importance of “knowing” in overcoming such challenges and asymmetries... this reality raises the need for an area of integration between education and work where vocational training is one of its main components.

To achieve this task and link scientific and technical knowledge in the workplace, universities have carried out research processes in the areas and regions where professionals are trained in order to measure the



impact and reduce the gaps that have been generated between what new professionals offer and the real needs of the business environment.

In this sense, the recognition of the competencies that are required for the new professional to contribute significantly as a social actor in economic progress, and recognize from his profession the contribution expected of him in a society that operates under the principle of social justice, as well as in the growth of the region's economy, are the most important. University-business-State work tables, such as the one held in Manizales in June 2019 after discussing the contribution of the SDGs, become action strategies to minimize gaps between what business actors expect from new professionals. It is joint work in which the actors, the territory and the education system grow. It has been thought of a skills-oriented training in which future professionals are able to innovate and positively transform the environment impacting the territory with their knowledge. However, such reform has not been sufficient, since the gap between what is taught in educational institutions and what the company, and the society expects of the worker's performance continues and the information of the systems collected through the systems, articulated by educational cybernetics, show that the gap is greater in distance education. In massive programs, in which students do not have synchronous moments, the situation worsens.

It is clear that the growth of a nation-state depends on its educational processes. As S3nchez and L3pez (2013) put it:

The main companies of society, both private and public, are conducted through to the performance of professionals, trained in Higher Education Institutions in the various fields of action and work in the complex social organization of States (p. 46).

Therefore, although educational policies have stipulated changes in their curricula, it is urgent to think more specifically about new ways in which professionals take on the challenges of the 21st century in an ethical and critical manner. Processes that mobilize in a real way, through the platforms the recognition of their actors and needs, and generate spaces in which the subject is collected as the construction of knowledge through social interaction. In the words of Montoya (2007), when presenting the progress of the Mission-Science, Education and Development Meeting of 1994, a large part of the current education system is characterized by fragmented, uncritical, outdated and inadequate education, which does not allow conceptual integration, which demotivates the curiosity of the students and develops inappropriate cognitive and behavioral structures.



For this reason, some teaching models have been reformulated, thinking about the relationships that are woven between the actors and the context. However, it must be said that this conception of training according to the needs of the business sector has been implemented in recent years in face-to-face education. Despite this, given the rapid change of the technological era, this transformation is not so evident in the field of distance education. In a large part of distance education systems, professionals are trained in scientific-technical content and knowledge through virtual platforms. Few designs monitor the training by competences and almost none recognize the particularities of the context of its students. Pedagogical designs do not respond to the needs of the environment. Precisely because of its mass-media nature, distance education has left aside the social actors that are part of a given context and offer a quantity of information and knowledge in the light of global requirements, given that its population belongs to the 'global village'.



Although distance education models have been evolving and have recognized, to some extent the role of actors in these systems, it is necessary to state that, to date, only the general needs of the business sector are taken into account and the particularities of the local are ignored. There, the gap —stated above— becomes wider, since distance education systems ignore the needs of each of the contexts to which their students belong. It is important to say that even when a vocational training program in a distance education system is offered for a given country; Within there are various regions and productive sectors with social needs tied to the environment of each region.

Distance education breaks geographical barriers, the borders of a territory. Thus, ignoring the particularities of the actors and the context does not respond to the challenges of each national and local instance. It is not the same to train business administrators for a city than to train them for the challenges of the rural context. It is not the same to train teachers who will work in violent areas and where they have suffered forced displacements, as is the case in Colombia, to train teachers for large cities whose social problems are different. It is not the same, to train for the challenges of those who are part of social networks and have turned them into a lifestyle than to think of training for those who remain illiterate in them. The skills required by one of the actors that make up distance education systems vary with their environment and with the problems they face. This is something that the university is obliged to identify and transform when proposing a distance vocational training system.

In this sense, the two great challenges faced by distance professional training in the 21st century are due to the recognition of the actors and their particularities, and the recognition of the context they will face in their working life. It is not a bet, as it is sometimes misunderstood, of education for work, based on training in general and specific skills from a contextless curriculum; but an exercise in which they are linked in a real and effective way university-actors-context-business-State.

Thus, given the proliferation of actors and contexts that interact in higher distance education, one must begin to think intentionally about changes in curricular, pedagogical and didactic designs, in order to articulate them to the curricula and the designs of classrooms and activities. All this to favor processes of innovation, interactivity and social interaction, which mobilize in students the development of skills and competencies to think about their reality in a critical way, and thereby contribute to minimizing accordingly the gap between educational supply and labor demand with the requirements of each region in which future professionals live.

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## Actors, contexts and educational cybernetics in vocational training

Among the many elements that make up a system of distance higher education<sup>3</sup>, this study bets, in the face of the new challenge, to rethink the role of the two previously stated: actors and contexts. In the various phases or models that have been generated throughout the educational processes mediated by ICTs, attention has been paid to resources, mass-media, interactivity, social interaction, and skills, among other elements. However, given the characteristics and the way in which this type of education<sup>4</sup> has been carried out, it is perceived that these two components of the system are the crankshafts to achieve the objectives pursued and the goal that the UN sets for 2030.

The actors and contexts are the crankshafts that articulate the other elements of the system. Therefore, if one thinks about the role, they play in distance education systems, it will be possible to rethink educational processes in order to train new critical professionals: subjects capable of innovating in their environment and achieving sustainable development in their territories.

The recognition of the actors (teachers and students) as human beings who belong to a specific context will allow the generation of spaces for the social construction of knowledge and thereby impact the territory.

In this sense, recognizing the contributions of educational cybernetics, this is a commitment to the recognition of the other and its environment to contribute to the development of sustainable territories. Thus, to the extent that the actors in the process are recognized as human beings who are part of a context, it will be easier to think about competency education; in terms of Salazar (2016), a more humane education that adapts to the needs of the industry and that is capable of responding to the requirements of local and global territory.

This seeks to bring the training of individuals closer to the context where they are since it is from the economic and social functioning of the context that individuals seek a formation that places them in possession of knowledge with which they manage to have a better life. The selection of a certain profession depends, among other things, on the business requirements of the area in which future professionals will perform. In this way, the new deposits of employment arise, which from state policies are related to education through the need for training, making explicit what type of employee is required, and what skills are expected of new professionals to perform well.

However, it is important to highlight that distance education systems have in their favor the use of technologies, as well as the new tools of educational cybernetics. One cannot think of a real transformation without making good use of them. Technology becomes a tool to facilitate operations around context recognition; In addition to being the hub of interactivity and social interaction between the actors that are part of the system. Through ICT, distance education can be transformed and such changes, as Maturana and Varela (1973) put it, will lead to the strengthening of the capacities of the mind, body, and senses of the human body. As Gimeno (2008) puts it, ICTs allow virtual spaces within which, from a good pedagogical and didactic design, knowledge flows, which in turn provides for the student to have a better understanding of reality and thus improving his quality of life. The challenge, as stated by Hernández and Corona (2016), must be consciously and intentionally assumed by teachers to improve the educational practices in cyberspace and thus respond to the demands of the global technological world.

However, educational cybernetics can be very useful if it is thought of as a tool to understand how to operate these educational systems and their nature. The information generated in the interactive processes and the educational systems that have been designed, provide the teachers elements to start with their classroom and course designs, in order to favor the students according to their environmental needs. It is not a question



of making a design for each student or each context, but of identifying the particularities of the culture, the economy and the social development in which the students live and thus thinking about a real configuration of the educational system, in which spaces for dialogue and discussion are favored, which allow the student to be placed in his professional role and that brings them closer to the possible problems he will face in his context when exercising as a professional.

From this perspective, educational cybernetics becomes an axis to mobilize this change not only because it allows the recognition of the human component that creates and interacts in the educational system, but because it allows us to understand that symbiosis that occurs between the biological, the social, and the cultural, framed in a specific context and time. The recognition of human complexity, of the complexity of educational systems and, in turn, of regional economic systems, allows those who design distance education systems to have a foundation on which to operate. In this sense, educational cybernetics, in addition to enabling a different conception of 'system', which escapes the traditional, allows to have the details of how they work, to articulate them and better understand the educational phenomenon and the problems that arise in the training of professionals in distance education systems.

It is undeniable that society is immersed in a world of systems, the real problem is knowing their functioning and the articulation that is generated between them. A tree, a book, a park, some computer, a vehicle, a social communication, languages, data, and information are systems, among many others, are all systems. We live in a universe composed of systems and they all relate to each other.

The recognition of these systems and their operation allows improving the processes of interaction and social interactivity in distance education systems.. Therefore, educational cybernetics constitute a crankshaft when it comes to understanding how distance education systems, educator systems, actors and contexts (which are also systems) operate, as they also share its characteristic: they are complex entities, formed by parties in mutual interaction, whose identity results from an adequate harmony between its constituents. In the words of Aracil (1986), systems are endowed with their own substantivity and the actors who interact in them must understand the functioning of their nature.

Seen this way, being in a world immersed in systems is necessary for subjects to develop the ability to distinguish them in order to interact with them, as Beer (1982) puts it, especially if within these complex systems one is teaching in a distance education system. Given that by re-



cognizing its nature and functioning, the teacher will be able to identify, as Beer (1982) has determined, that “as well as it is possible to expand a system to cover a greater perspective, it is also possible to simplify the system reducing it to a smaller version” (p.25)<sup>5</sup> From educational cybernetics, the teacher will be able to see in the system, of which he/she is part, all its dimensions in order to not fall into the reductionism that has occurred until now.

Thus, educational cybernetics allows the teacher to understand that the education provided to the professional, being a system, must be treated on its foundation as such. It must be studied in its parts and in its entirety and must be understood in its relations with other systems, in this case, labor.

From this approach, it is suggested, following the ideas of Foerster (1991), that educational cybernetics will make it possible to recognize actors and contexts, to the extent that it provides us, through the appropriate use of ICT, clarity about the composition of the systems that are articulated when it comes to training future professionals. Thus, starting with the observation of the behavior of the real systems that interact in a system of distance higher education, including the labor system and its deficiencies, will allow to go beyond the current design and rethink the competencies that each professional requires, both general and specific, tied to the need of context. This implies having an understanding of the particularities that interact in a real system.

In accordance with the above, Fainholc argues (2004):

A quality program not only sends information (of high quality) but also cares about providing a personal experience with each student and with each tutor/teacher. That is, it is to move from the stage of external information to consider explicit personal knowledge. This involves carefully planned and monitored processes of social interaction and technological-educational interactivity (p. 4).

It is, then, to think about new designs that favor the link between the educational system mediated by technologies, the labor system, the social system in which the creators are immersed and the knowledge system that emerges in this interrelation.

Also, by linking educational cybernetics, a design can be planned from the identification of the fundamental components and processes that will be carried out in the training of future professionals, anchored to the systems that are articulated for this purpose. The above demands, in terms of Foerster (1991), the identification of the feedback structures



that allow explaining its behavior, that is, a permanent analysis of the system and its nature in order to improve the teaching and learning processes thinking about articulating: education-employment.

It could be said that the recognition of the nature of these systems and the interaction between them will lead to the identification of the elements that allow improving the processes of distance education in terms of professional training. Since these in their nature end up being, as Beer (1982) puts it, “probabilistic systems”. Excessively complex systems, since they involve the biological, the social, and the cultural, as well as being framed in political, economic and historical contexts. Therefore, the interactions that comprise it and the results obtained in the interaction of these two systems (education and business) are ever-changing from their elements to their impacts on the environment. A complexity that also links human intentionality (which by its very nature also becomes complex).

The panoramic optics provided by educational cybernetics allow us to identify the limits of interaction between one system and another, not only to establish points of convergence but to identify the points of divergence between the systems that interact. This is how having the information and the analysis of the interaction between the operating systems can make designs that tend to reduce the gap between what the professional can provide in their exercise and what the environment demands in order to achieve sustainable development. What Foerster (1991) has called the benefits of cybernetics when contemplating the organizational structures of each system and the processes of interaction between one system and another: interactions that are generated given the similar nature of both structures. In this case, it could be inferred that what underlies the structure of both is the social system component.

However, the analysis of the scope of educational cybernetics leads to other questions in order to respond to the problem, including: What elements become essential and common to the education system, the distance education system and the business system? What is the element that makes possible the interaction links between the stated systems? How to achieve effective transformations in vocational training to reduce the gap between educational supply and labor demand? Questions that allow the discussion to land on a common element that underlies the entire nature of social reality and, therefore, of the social system: language (Searle, 1969, 1995).



## Language in distance education systems

Educational systems and labor systems are part, among many others, of social systems. Its link, as educational cybernetics has shown us, is woven from the accumulation of information that circulates. Information, in turn, encoded and built by symbolic games.

Distance education systems require the use of various language games, as Wittgenstein (2009) said so that students articulate themselves as actors in the social construction of knowledge and reach an impact by transforming, from their professional practice, the environment. Language allows, in distance education systems, to move from interactivity to social interaction, as stated by Rodríguez and Sosa (2018). In this sense, through language one of the objectives of educational cybernetics is achieved: humanize the education system. In terms of Wiener (1984):

When I contact another person, I give him a message; when he responds, he gives me something in relation to what I said and that contains reports accessible to him primarily and not to me. When I regulate the actions of another person, I communicate a message; although it is in the imperative mode, the communication technique does not differ from that of the statement of facts. In addition, if my regulation is to be effective, I must be aware of any message from him that indicates that I have understood and obeyed the order (p. 86).

Cybernetics becomes, therefore, essentially, in the science of information and communication, which seeks to obtain information from the world and process such data to seek some control of the phenomena that occur, mainly through the use of the machines, always operating feedback loop of the information in the whole process.

Thus, the analysis that enables educational cybernetics facilitates the understanding of the process of interaction with others in ICT-mediated education, building new knowledge from information and transforming social reality with that knowledge. Seen this way, language is imposed as the regulatory axis of the process of social interaction. Similarly occurs with education, since it is a process in which communication is the basis of all training activity. The reason why, in the pedagogical designs, it is urgently necessary to consciously involve the actors within the system so that from their communication processes they propose new alternatives for a real change that impacts the territory with sustainable development.

In this perspective, the language games proposed by Wittgenstein (2009) and their intentional use, as Searle (1969) puts it, make communi-



cation processes loaded with meaning possible. Which demands, in turn, that the pedagogical and didactic design of distance education systems must be mostly thought of from the intentional use of language in order to overcome instruction, to critically address the flow of information and carry out real feedback processes that favor the social construction of a knowledge that will impact the context.

Thus, the feedback in the professional training process should not only be based on scientific knowledge but according to the needs of the context and the particularities of the region in which the students will carry out their work. Therefore, language is the element that allows for effective communication that accounts for these peculiarities, as well as the development and strengthening of the skills necessary to respond to specific problems in the workplace.

It is undeniable, then, the role played by ICT and cybernetics and, in their nature, the use of language. The commitment that teachers must assume is semantic and pragmatic with language when thinking about designs that favor dialogue and discussion spaces to intentionally mobilize the social construction of knowledge. The use of language allows humanizing the processes within the educational systems, in addition, as Sosa and Rodríguez (2018) have stated, it makes it possible to take the instructional step to achieve the real construction of knowledge and, of course, enabling social interaction that favors the formation of the competent, ethical and, above all, critical professional future.

The correct use of language makes possible the real transformation of the environment from the economic and social field, as expected of the new professionals. The processes of effective communication between direct actors (teachers and students) and indirect actors (entrepreneurs) within distance education systems must reflect joint work; in such a way that the training professional identifies from his formative process the characteristics of the territory and the labor needs within it, and thus with the knowledge acquired together, generate new opportunities to transform his context. Seen this way, the actors are, then, the only ones who can transform social reality and do so to the extent that they engage and jointly build the educational process. A construction that implies the use of language.

According to the above, if the actors are those who mobilize the operation of distance higher education systems—since they are human beings who find the need to train, be competent, and must take on the challenges to transform the economic and social system with their professional work—they must have as a priority a reflexive formation that



generates spaces to discuss local problems and plan with their teachers actions that lead to change. This demands processes of accompaniment by the teacher-tutors, in order to know the conditions in the context in which their students are immersed, and with it to mark discussions and actions so that the new professionals impact their territories.

## Conclusions

The advanced changes in the technological era and their increased flow of information are a challenge for distance higher education systems. Training professionals to solve the social and economic problems of the context in which they will operate has not been the priority of distance education systems, which, given their mass-media nature, end up ignoring the actors and their contexts.

This brings an urgent call to the teachers and universities that create and design the programs of these education systems, in order to raise awareness of the challenges faced by the professional training of the 21st century and the gap that is evident between what is expected in the business and educational sectors that point towards more global directions.

This challenge makes it possible to identify that one of the great failures in this process, which sharpens the gap between labor supply and demand in vocational training, is the lack of knowledge of the actors and contexts. Said ignorance, as well as giving priority to the circulation of information in instructional designs—among other factors— has led to thinking about models in which information is privileged over knowledge, instruction over reflection and discussion, and the global village above the particularities of the local environment. Giving way to in mass formation, without context and without the human component.

Faced with this problem, educational cybernetics appears as an option for change and for those who design distance education systems to take on the challenge of forming human beings. Recognize them and lift them to their role in social change. Something that is possible to the extent that the educational model of these systems is directed towards the spaces of discussion and dialogue, spaces that allow the recognition of all the subjects that belong to a context and who from their professional practice are in the moral and political obligation to critically change the environment. All this in order to achieve sustainable development.



## Notes

- 1 In the instructional model, the teacher or educator adopted the figure of “instructor.” He was in charge of the content and his expertise for pedagogical design and guided the processes in the virtual classrooms through instructions. This process evidenced great shortcomings in the accompaniment and discussion because they should have favored student-machine-information interactivity.
- 2 For this phase, the figure “instructor” was changed to the figure “tutor”. The change implied greater closeness with the student, pedagogical and didactic designs in which there was feedback to improve the learning processes of the students. The tutor performed more support during the process.
- 3 Understand as systems those complex entities, formed by parties in mutual interaction, whose identity results from an adequate harmony between its constituents, and endowed with its own substantivity that transcends that of those parties (Aracil, 1986).
- 4 Distance education systems are designed for big groups of students. They also operate in cyberspace that, for the most part, is either unknown or ignores the territory in which the actors are located. In this sense, when professional training programs are created, pedagogical and didactic designs become unaware of the subjects and their environment. The massiveness and heterogeneity of the groups of students that are part of these systems has led teachers to neglect or put in the background the recognition of the other (their students) as a social and historical being that belongs to a specific context, in who in turn there are certain particularities and needs to respond to their professional practice.
- 5 The reduction to which reference is made consists of what is happening today, that is, the ignorance of the parties and their particularities. The whole has been seen in the formative process, but not the parties, not the actors and the contexts that constitute the system and its rationale.

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