

## Dynamic educational philosophy for learning technology management\*

## Filosofía educativa dinámica para la gestión tecnológica de aprendizaje

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**Abstract:** Notions such as STEAM education, computational thinking, gamification, and the manipulation of ICT have appeared to configure what is known as Education 4.0. In the Latin American context and the economic, political, cultural, and social situation of the countries that make up this geographical space, it is worth asking to what extent Education 4.0, or some of its elements, have been implemented. Latin American educational systems reflect a minority number of countries that have assimilated the elements of this type of education; evidencing at present the intelligible relationship between economic development and educational model.

**Keywords:** Gamification; Industry 4.0; STEAM education; information and communication technologies; computational thinking.

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**Resumen:** Nociones como la educación STEAM, el pensamiento computacional, la gamificación, y la manipulación de las TIC han aparecido para configurar lo que se conoce como Educación 4.0. Bajo el contexto latinoamericano y la situación económica, política, cultural y social de los países que conforman ese espacio geográfico, cabe preguntarse en qué medida se ha implementado la Educación 4.0, o algunos de sus elementos. Los sistemas educativos latinoamericanos reflejan un número minoritario de países que hayan asimilado los elementos de este tipo de educación; evidenciando en la actualidad la relación inteligible entre desarrollo económico y modelo educativo

**Palabras clave:** Gamificación; Industria 4.0; educación STEAM; Tecnología de la Información y Comunicación; pensamiento computacional

## 1. INTRODUCTION

The history of humanity has been marked by decisive and determining events that modified the social, cultural, economic, political, structural, reality, therefore, the very life of the human being. One of these events raised over time is the process that directly transformed technology, as well as socioeconomic processes and structures, which is called the Industrial Revolution (Menéndez & Giucci, 2020). In this sense, in a traditional way, four industrial revolutions are recognized, the first three occurring during XVIII, XIX and XX, the fourth being in the present century. Consequently, we are witnessing the consolidation of the Fourth Industrial Revolution (Patiño, 2019).

This process, which is taking place in the XXI century, is defined by its innovations: the enormous and increasingly rapid advance of genetic engineering and neuroscience; the development of state-of-the-art technologies at an accelerated pace; nanotechnology; the expansion of software and other devices, as well as digital communication networks (social networks, smartphones, among others) (Schwab, 2016). On the other hand, unlike previous processes of industrial revolutions, this one distinguishes by some particularities: the vertiginous increase in the speed of their changes and innovations, as well as in the scope, scale and impact of them (Arocena & Sansone, 2020). Similarly, an exceptional aspect, so far, also characterizes the Fourth Industrial Revolution: the blurring of the boundaries that, traditionally, divide the areas related to the physical, biological, digital, inorganic and sociocultural sphere; betting on a development that unifies them (Gómez et al., 2020). Then, it can be inferred and affirmed that the key concept to understand this revolutionary process is that of innovation.

In this sense, a tripartite guideline can be recognized in the changes brought about; namely, consumption behaviors, especially with the new generations; technological amplitude and proliferation in the various areas of human life and the emergence of new modalities and systems of commerce and negotiations, influenced by the digital world (González-Páramo, 2017). In this information age, the digital age that increasingly implements more technology at an increasing rate, a revolution whose central agents belong to the immaterial universe of the internet and the digital. (Menéndez & Giucci, 2020). Even its impact can be found in other types of processes, such as the development of urbanization, the exodus from the countryside that continues to be perpetuated, now with greater intensity; however, those most visible and promising due to the infinity numbers of uses that can be given are: hyperconnectivity of communicative media, digital interconnection of objects (internet of things and 3D printing; Oliván, 2016).

Therefore, the so-called Fourth Industrial Revolution, leads to the transformation of sectors dedicated to the production, manufacturing, innovation, among others; especially with regard to the processes of automation, digitalization and optimization of virtual information flows (Becerra, 2020). It is to the

accumulation of these new modalities, and the result of them, that it is designated with the denomination industry 4.0.

## 2. INDUSTRY 4.0

Indeed, the whole series of innovative products that come to the light in the framework of the fourth industrial revolution and their technologies, including all this development, has led to the emergence of intelligent manufacturing centers that merge digitalization and automation. One of the pioneering countries in such an enterprise is Germany, whose entry and conceptualization of Industry 4.0 occurred at the beginning of the second decade of the XXI century (Antúnez, 2019). Thus, characteristics and purposes, were shaping and becoming consistent with the material realization of their goals.

Consequently, industry 4.0 proposes new organizational guidelines and the impact of the life cycle of a certain product, all of which can be achieved thanks to information technologies. Then, their main interest to develop, and where they focus all their attention, is in the search and creation of productions and intellectual services; These are: intelligent innovations, intelligent automated supply, mobile intercommunication, cloud computing, big data, the M2M communication method, three-dimensional printing, cooperative robotics and augmented reality (Del Val, 2016). Similarly, it points towards the development of digitized or automated processes, as well as varied technologies in manufacturing and the development and consolidation of a cyber-physical network industry (Chacón-Ramírez et al., 2020).

On the other hand, it is also characterized by its high level of acceleration in the search for its own sustainability in today's world and perpetuating the effectiveness of its processes and economic profitability. It is therefore not surprising that the widespread development of automation is on its immediate agenda; an incessant communicational flow of information within a decentralized system (Barona and Velasteguí, 2021). Then, industry 4.0 would yearn for the advent of a change in production to alleviate current deficiencies and optimize strengths, which should result in a qualitative and quantitative increase in productivity (Hernández-Gómez & Hernández-Calzada, 2019).

In Latin America, there is a clear disadvantage in its implementation when compared to nations with more developed industries. In any case, it represents a challenge, to the extent that its paradigmatic assumptions also imply a different way of understanding business and industrial processes, which escapes concrete actions to carry out the introduction of industry 4.0 (Chacón-Ramírez et al., 2020; Corzo & Alvarez-Aros, 2020).

Accordingly, the repercussions of Industry 4.0 are immense, even affecting areas, aspects and spaces that, at first impression, would not seem to have an apparent connection; However, it permeates almost all human activities. One of them – of vital importance for the training processes in which it operates – is education: the products

of Industry 4.0 influence – and will continue to do so – decisively in its various practices. In this way, it is from the inclusion, both as vehicles and primary tools in teaching, of the new technologies produced by industry 4.0 within the framework of the Fourth Industrial Revolution, that we can speak of the existence and development of an Education 4.0 (Huerta & Velázquez, 2021).

## 2.1. Education 4.0

An education 4.0 is defined as the pedagogical proposal and approach that seeks to adapt positively to the new reality, which is being built as a result of Industry 4.0, and the changes raised with regard to technological implementation (Huerta & Velázquez, 2021). In this sense, it aspires to transcend the limiting space of the classroom, all the more so since, in many cases, the technology used by students in their daily lives surpasses, and by far, those found in their schools; in that sense, the establishment of information flows with a tendency towards a ubiquitous constitution would be sought. flexible and transdisciplinary, considering as a fundamental premise that, as there is a greater breadth of formats, the greater the possibilities in their development (Arredondo et al., 2021).

Hence, it is no exaggeration to assert that education 4.0 presupposes a change in the very conception of teaching, which emphasizes, questions and provides alternatives in specific educational aspects such as the personalization of teaching; the choice of how to learn —blended learning, flipped classroom, BYOD or Bring Your Own Device—; the elaboration and realization of projects; fieldwork; data interpretation; differential evaluation and personalized or the active participation of students in issues in which, traditionally, they had no interference, such as listening to students' assessments regarding the pedagogical curriculum with the possibility of implementing their suggestions depending on how relevant they are (Huerta & Velázquez, 2021).

Thus, education 4.0 is an interesting step in the democratizing process of education, although it is still possible to find some obstacles that are not easy to overcome – as in the case of the digital divide, especially in countries with little technological development. Even support for this democratization is within the very formulation of this new way of educating: it has equity as one of its preponderant axes (Martínez, 2019). However, in this overwhelming technological advance, a humanistic perspective must not be lost, thanks to which a potential instrumentalization of humanity at the mercy of its own innovations can be avoided.

However, it is worth recognizing that, in many countries, as is the case of those belonging to the Latin American region, educational processes have not exhibited rapid adaptability, just as the teaching staff has not been adapting and preparing at the same time as technologies were developed and advanced. That is perhaps the biggest challenge: teaching must walk at a pace, if not similar, close to industry 4.0. Therefore, it is a necessity that two specific conditions are presented for its

development: implementation of state-of-the-art technology and thorough training knowledge by teachers. In this way, the incentive is facilitated for students in education 4.0 and in their own educational training (Sánchez, 2019); in addition to education, keep up to date and attractive to new generations of students—even relevant, taking into account the familiarity of students with technology—(Velásquez et al., 2022).

In this sense, it is recognized that, in the context of the fourth industrial revolution, education 4.0 stands as a worldwide trend, including a necessity if the qualities and demands of contemporary society are repaired. Therefore, it is necessary to review the specialized and research literature that has addressed the main elements, tools and approach that constitute education 4.0, of which gamification, STEAM education, computational thinking and ICT have been recognized, and to be able, in this way, to explain the situation in which Latin American countries find themselves with respect to their implementation and, Finally, to be able to enunciate the importance and possibility of the generation of a dynamic educational philosophy in Education 4.0 and technology in its training processes.

### 3. GAMIFICATION OF TEACHING

The dynamics of teaching and the theoretical-methodological precisions are far from static, a historical review of pedagogy and educational practices is enough to corroborate it. And it is, in that sense, that gamification can be understood in teaching – the term comes from the English expression gamification and its root in the same language, game, “juego” in Spanish; hence in the Spanish-speaking world, it also receives the name of gamification – insofar as it consists, in general, in the use of certain components or strategies of games in non-recreational circumstances or exclusive entertainment. In this way, its use in education derives from the staging of dazzling stimuli, the playful factor originates the release of dopamine and, consequently, the formation of pleasant sensations and feelings that are motivating to favor interest, memory and information processing (Acosta-Medina et al., 2020).

As a consequence, gamification aims toward the creation of comforting educational experiences. Therefore, one of its constituent elements is to motivate the will to learn and, in this way, encourage the free will of the student to participate actively in the pedagogical processes. Teachers who gamify their sessions must offer instant, continuous and permanent feedback; as well as the proposal of tasks and challenges to be achieved and the reward and mutual interaction (Ortiz-Mendoza & Guevara-Vizcaíno, 2021). The products of the fourth industrial revolution can be included and processes optimized; however, this should not be restricted only to virtual games, but explore the wide range of playful dynamics such as role-playing, outdoor, board, competitiveness, among others (Carreras, 2017). Likewise, they present a wide variety of benefits: a solid teaching due to the attention given by the students; building greater participation in teaching and growing a committed attitude

towards it; results amenable to quantitative measurement; digital literacy; autonomization of the student and combining competitiveness and cooperation in the classroom. At the same time, it entails some difficulties, among which stand out, for example: technological gap, little support service for students that can generate frustration, deficiencies in technological skills, teacher or student resistance and slowness in adaptability (Encalada, 2021).

On the other hand, it is worth mentioning that gamification is not synonymous with a mechanical inclusion of the game. Such an assumption would imply an implicit and immediate failure. What it means is a structural change or a basic redefinition in the joint elaboration and achievement of learning and knowledge. Each of the game dynamics are not random disputes—or, at least, this should not happen—, rather, what is sought is that they attend to the needs and particularities of the students to whom it is addressed, all depending on their age, interests, abilities, etc. (Peñas-Moreno et al., 2020). Then, it is not only the use of the application, or mobile games, but the appropriation of a logic of the game in educational processes (Gil-Quintana and Prieto, 2020). This is more complex as it is a relatively recent field (Londoño & Rojas, 2020).

However, if we consider the process of gamification of teaching related only to the technologies of education 4.0, its execution and implementation in Latin America is characterized by being in the making in the vast majority of cases (Sánchez-Pacheco, 2019). It could be based on a symptomatic fact to consider gamification in Latin American educational centers: the production of scientific and academic studies that exist in this regard presents a very low percentage—9.21%—; Then, whether studies on their strategic use or pedagogical proposals, they are surprisingly scarce. Hence, the level of gamification in Latin American classrooms is not surprising (Rodríguez et al., 2018). Among the most used recreational platforms in the region, without a doubt, Kahoot is the most popular, whose use became widespread during the COVID-19 pandemic.

#### **4. STEAM EDUCATION**

In contrast, what is known as STEAM education has gained a lot of strength worldwide in recent years within the most advanced or avant-garde pedagogical proposals. Its name refers to the acronym Science, Technology, Engineering, Art and Mathematics and offers an idea about what it points to as an educational proposal: the integration of each of these areas of knowledge in a consolidated and participatory holistic learning. In this sense, what it proposes is an interdisciplinary teaching, which articulates all these disciplines, to obtain experiential, creative and direct application learning (Berciano et al., 2021; Greca et al., 2021) that speaks in a familiar or close language, to ensure the daily life of new students with positive and comprehensive results. It also allows students training in conflict resolution, the ability to reason and demonstrate, communication skills, relational and representational skills of a

physical, social, mathematical, cultural nature, etc. It is a learning that stimulates curiosity and research interest, while aiming to train students in gravitating areas within the growth of scientific and technological knowledge (Celis & González, 2021).

Within STEAM education there are pedagogical tools that are used relatively frequently in countries with innovative and effective educational programs, among which robotics aimed at teaching processes stands out. That is why it is given a special emphasis on its procedural nature, which has as particularity to develop in a triple phase; thus, a first instance of contextualization, is followed by the configuration of knowledge, stimulated by creativity, to conclude with the emotional push granted by the teacher in order to direct the knowledge poured and acquired (Zamorano et al., 2018). Then, an effective STEAM must be characterized by the inclusion of didactic materials of various kinds and their prompt implementation in the early stages of educational training (Ortiz-Revilla et al., 2021).

On the contrary, the acquisition of knowledge about new emerging technologies implies a preparation for the world that students of the XXI century will face in the later stages of their lives (Juvera & Hernández, 2021). That is why it has a great impact, especially of a curricular nature towards an innovative character, which has an impact on educational practices and crystallizes with benefits for both students and teachers for its dynamic learning and with a view to remuneration (Celis and González, 2021; Berciano et al., 2021). However, it must be recognized that the student is a fundamental actor, to the extent that the STEAM approach is opposed to an education of a mnemonic nature, since, from a direct action in the construction of the knowledge to be acquired and metacognitive reflections, they promote much more substantial learning. The influence at other levels outside the pedagogical scenario of STEAM is surprising, all the more so since there is a direct relationship between its development and socioeconomic and well-being indices in nations (Santillán-Aguirre et al., 2021).

In this regard, the Latin American situation leaves much to be desired because, it is positioning, if compared with countries in Europe, Southeast Asia, or English-speaking North America, stands out for its meager implementation and development in school education. Naturally, this implies a direct and crystallized impact in a series of deficiencies in scientific performance in the medium and long term by young people and almost zero productivity in the research field when compared to countries with a consolidated STEAM system. It can be recognized, in the Latin American context, a certain delay in its implementation (Juvera & Hernández, 2021); thus the deficiencies of the region are many: the main one, access to technological means and the internet in schools in both rural and urbanized areas; even the corruption that reigns in Latin America negatively affects the implementation of the STEAM approach, due to the unwillingness of the authorities concerned to invest in it. Hence, the countries of this region are characterized by holding a passive agent role in terms



of technology consumption, without a clear hint of creative interference (Mori, 2020). That is why the STEAM approach should be much more encouraged.

## 5. COMPUTATIONAL THINKING

One of the biggest challenges facing Education 4.0 is related to the paradigmatic educational configuration itself. This involves an epistemological leap; diverting the pedagogical attention that can be placed on the simple containment transmission towards a view that privileges learning skills and abilities, thus facilitating the formation of critical thinking in students (Balladares et al., 2016). The latter has close ties with the proliferation of technologies in human life and their insertion in the educational sphere, in which communicational thinking offers a valuable alternative.

In a sense, it can be mentioned, succinctly, that computational thinking also means a transfer: to refer basic notions —but no less important— of computational computer knowledge to the approach and resolution of problems raised in the day-to-day in the educational context. In this way, it would be innovating in new ways of solutions, while making use of all the benefits that computing can offer. (Basogain et al., 2015). Then, it follows that this alternative way of thinking seeks a harmonious unification of digital technology and human thinking; for which it focuses on the human development of a series of skills not exclusive to programmers, but extended and that all human beings potentially harbor and are ready to develop and optimize. Hence its importance within educational processes. These mental competencies would be: fragmentation, sectioning a problem into its constituent parts for a better resolution; generalization, contractability and similarity to a problem with similarities or differences in its constituent matrix; selectivity of data, ability to omit irrelevant information and, finally, the formulation of algorithms, that is, creation of concatenated plans and rational sequence for specific resolution purposes. Computational thinking in education is stimulated and developed, mainly, through the use of computers and other 4.0 technology; however, this is not exclusive, as it can be worn without these, in what is known as the unplugged form (Huerta and Velázquez, 2021; Ortega-Ruipérez, 2020). Computational thinking is inserted in the process known as the new literacy, which has acquired in the last decade a special relevance worldwide, deploying various programs to stimulate and achieve its realization (Cossío, 2021; Roncoroni & Bailon, 2020).

Thereby, many countries have officially implemented the promotion of computational thinking in their curricular programs, among which the cases of England – the first country to carry out such a measure – the USA, Finland or Singapore stand out. On the other hand, in Latin America, Uruguay is the first country to implement it, thanks to Plan Ceibal, which focused its action plan on educational processes at the secondary level (Cossío, 2021). Now, that this happened in Uruguay and had that country as a precursor in the region is not a coincidence, but has a long history. At the end of the 1980s, international projects were developed in which some

Uruguayan educational centers participated. These, although they were small, did not cease to be significant in their educational progress and facilitated the subsequent development of projects with special emphasis on the instruction of students in computational thinking and relating it to robotics. However, its obligatory nature in regular education at the national level did not occur until much later, being preceded by Argentina in 2018; however, in other Latin American countries, its obligatory nature in education is much more recent or null —Argentina, for example, followed such measures towards 2018— (García, 2020).

The case of Argentina also stands out for the comprehensive plans in search of a new literacy and some significant improvements in educational processes, with the deployment of various strategies such as the Connect Equality Program, Our School, PROGRAM.AR or the National Comprehensive Plan for Digital Education (PLANIED). However, due to their recent emergence, it would be difficult to weigh the current state of the practice of such programs in Argentine schools; however, it is undoubtedly a great advance in the inclusion of technologies in educational centers and computational thinking (Vázquez et al., 2019). It is also worth mentioning Chile, a country that, despite the great efforts to include the experience of computational thinking in educational practices through concrete measures, as demonstrated by the existence of the National Plan for Digital Languages, with a view to training teachers in technological skills coupled with an optimal transfer of these to their students, It still has low indicators in terms of technological and digital skills. Finally, the situation in Mexico is characterized by a series of attempts whose implementation and conclusion were far from expected, especially due to the reduced technological infrastructure. However, since 2018, this situation has been remedied through the Digital Inclusion Plan, which emphasizes the inclusion of computational thinking (Vázquez et al., 2019).

## **6. INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT)**

The term ICT, formed from the initials corresponding to Information and Communication Technologies, refers to a series of technological inventions that focus their attention on the unified use of advances in computing, telecommunications and microelectronics; of a digital or computational nature (Díaz-Barriga, 2013). They play a crucial role in current education, all the more so since they serve within the teaching processes as mediating instruments or guides, one more part within the pedagogy that should be almost daily its use. Its use was also of gravitating importance in the face of the health crisis derived from the Covid-19 pandemic, in the way of facing it and avoiding the cessation of pedagogical activities was very prolonged (Avendaño et al., 2021); Similarly, although they are not exclusive to the educational field, their presence in this is an imperative today since, at the same time, they are stimulating for students in a very high percentage due to

the dynamization they operate in the teaching-learning processes (Quiroz-Albán and Tubay-Zambrano, 2021).

The educational value of ICT lies in its ease of providing meaningful teaching with multiple variants that can be adapted to different student needs. Thus, they aim to develop specific and coherent skills with contemporary society; dynamize methodological procedures within the classroom; optimize the pedagogical program that the teacher will deploy within the classroom, in the elaboration of knowledge and the integral evaluation of it; enrich the educational context, as well as the physical space in which pedagogical processes are carried out; innovate in the skills promoted in education and greater familiarization with technological devices and the relevant and positive use thereof (Quiroz-Albán & Tubay-Zambrano, 2021).

In this sense, ICT is also made up of all those tools that, in turn, constitute what today is known as web 2.0: blogs, wikis, and social networks – in the latter are WhatsApp, Facebook or Twitter, which are used in education more frequently; as well as software, hardware, computers, electronic devices, platforms, think of smartphones, the internet, etc. (Rueda et al., 2021). In them it is correct to see their advantages in education, which are manifested in: the possibility of cooperativizing educational processes and the activities that occur in it; multidirectional, which allows simultaneity and polyphony in the flow of information—ease in the diffusion of educational content—thanks to the fact that it allows the realization of pedagogical meetings and educational sessions in a non-witness dynamic, autonomy in learning and provides a high level of interaction (Solórzano-Barberán, 2021; Rueda et al., 2021).

However, in the context of Latin America, its development, implementation and adaptation are discouraging if judged on the basis of contrast and comparison: at the initial, primary and secondary levels, it is, to some extent, recent, while in other parts of the world, it already has a not inconsiderable amount of decades of promotion (Quiroz-Albán & Tubay-Zambrano, 2021). To this situation is added one already known and that greatly influences the full implementation of the constituent elements of education 4.0: the percentages of access to the internet. Accessibility is, without a doubt and in every sense, an obstacle causing delay (Quiroz-Albán & Tubay-Zambrano, 2021).

The reduction of the digital divide does not come from particular initiatives or efforts – although it is true that they can contribute – but is largely subject to government policies and public strategies for digitalization (Orozco-García et al., 2021) that promote development in students not limited to mere implementation. In this sense, there are some alternatives in the region that seek to increase education 4.0 through the use of ICTs, not inconsiderable efforts if a long-term view is taken that seeks its proliferation at national scales. In this sense, it highlights the implementation of computers, tablets, and other devices in compulsory regular education; However, many of the state projects were marred by accusations of corruption. On the other hand, we can mention the Argentine project for the application of ICT in education

with the opening of the Educ.ar educational platform and the portal “Seguimos educando” (Aloy, 2021) or the Peruvian case with the “Aprendo en Casa” program, developed at the specific juncture of the COVID-19 pandemic (Morales, 2020); also, among the most used ICTs in Latin America, the telecommunication platforms Zoom, Microsoft Teams (Ramón, 2021), Google Meet and Zoho Meeting (Cortijo, 2021) can be recognized; applications such as Audacity or YouTube (Cela, 2021) and others such as GoAnimate, Genially and Vyond (Calle et al., 2021).

## 7. FINAL CONSIDERATIONS

The route and the results of this study allow us to outline a panoramic and general scenario of the educational systems of Latin America, especially in relation to the development of what is known as Education 4.0, understanding this as a new way of considering and practicing education, adapting to the new reality of today's contemporary society by incorporating the tools, devices and technological innovations aroused within the framework of the Fourth Industrial Revolution, thanks to the creative impulse, development and production of what has been called Industry 4.0.

In this sense, the implementation of the Education model is, at present, a global trend of educational theoretical-methodological renewal, characterized by various approaches and devices introduced in teaching, such as gamification, the STEAM perspective, computational thinking and ICT. However, in this new pedagogical trend, the Latin American reality reflects a small number of countries that, in fact, could be classified—not without shortcomings—as education 4.0, among which we can mention, in the foreground, Uruguay, Argentina and Chile, with Mexico and Brazil in the background; Despite this, it is paradoxical that, although they are among the Latin American nations with greater deployment of education 4.0, they do not have a significant place in the production of technology that they strive to include in their educational processes (Escuder, 2020). Likewise, the most relevant and urgent impediment in its final resolution is the digital divide. This manifests itself as a retarding agent in the development of industry 4.0, to the extent that it does not contribute to generalized participation and enjoyment of technologies and, in turn, is closely linked to the poverty rates – quite high – that the region presents (Rodríguez-Alegre et al., 2021). In this sense, policies that combine the private and the public in a joint advance for the elimination of gaps are necessary on the basis of an integrated and globalizing program that connects the edges of education and technology in a single line to follow, with practical and concrete incentives in the promotion of connectivity and technological accessibility. Which directly affects the realization of a 4.0 school (Anaya et al., 2021).

Therefore, the formulation and generation of a dynamic educational philosophy in motivation is proposed, while the justification of this study. In this way, a dynamic philosophy is alluded to in a double directionality: on the one hand, considering the

educational process as an instance in constant change and movement, like the actors, materials and instruments that take place in it, this occurs in a constant remaking of themselves in function of the extrinsic ones that arise from the historical devenir, social and cultural and, on the other hand, considering the theorization of educational pedagogy as a gravitating factor, insofar as it officiates as the basic support of everything that education and teaching-learning implies, so that, a dynamic educational philosophy in this direction, implies a reform of the bases and A dynamic epistemological leap that takes into account the inclusion of new technologies and new realities as a constitutive part that requires it to reformulate its own principles. In this sense, in the implementation of education 4.0 it is not enough only the material equipment and the technological conditioning of the physical environment, because although it is a fundamental aspect, this must be accompanied or preceded by theoretical reflections that place education 4.0 in the context in which it is inserted, which guides and raises awareness among students and teachers to facilitate learning in relation to the creative processes and use of technological resources derived from the fourth industry.

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