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ACTIVITY THEORY: FUNDAMENTALS FOR STUDY AND DESIGN OF BLENDED LEARNING

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Abstract

The objective is to explore activity theory as a suitable interdisciplinary theoretical framework, where to place the social, pedagogical and technological elements of blended learning in higher education and considering the adoption and effectiveness of blended learning, constituting the new normality, in the current context of presence and intensive use of digital technologies in education. It concludes on the international validity of the theory of activity and its permanent transformation and historical evolution from its origins to the present day, it allows to transcend the individual character towards a collective character, adequately representing the social, technological and historical-cultural elements present throughout the formative activity.

ACTIVITY THEORY • BLENDED LEARNING • HIGHER EDUCATION • TECHNOLOGY

TEORIA DA ATIVIDADE: FUNDAMENTO PARA ESTUDO E DESENHO DO BLENDED LEARNING

Resumo

O objetivo é explorar a teoria da atividade como um referencial teórico interdisciplinar adequado, situando os elementos sociais, pedagógicos e tecnológicos do blended learning no ensino superior, considerando a adoção e a efetividade do blended learning, que constitui a nova normalidade no atual contexto de presença e uso intensivo de tecnologias digitais na educação. Conclui a validade internacional da teoria da atividade e sua permanente transformação e evolução histórica, desde suas origens até os dias atuais, oferecendo transcender o caráter individual em direção a um caráter coletivo, representando adequadamente os elementos sociais, tecnológicos e histórico-culturais presentes em toda atividade formativa.

TEORIA DA ATIVIDADE • ENSINO HÍBRIDO • ENSINO SUPERIOR • TECNOLOGIA

THÉORIE DE L'ACTIVITÉ: FONDEMENT DE L'ÉTUDE ET DE LA CONCEPTION DU BLENDED LEARNING

Résumé

L'objectif de cette étude est d'explorer la théorie de l'activité comme cadre théorique interdisciplinaire approprié, tout en situant les éléments sociaux, pédagogiques et technologiques du blended learning dans l'enseignement supérieur et tenant compte que l'adoption du blended learning et son efficacité constituent la nouvelle normalité dans le contexte actuel d'usage intensif des technologies numériques dans l'éducation. La conclusion est que la validité internationale de la théorie de l'activité, avec sa transformation permanente et son évolution historique, depuis ses origines jusqu'à nos jours, nous permet de transcender son caractère individuel vers un caractère collectif et représenter adéquatement les éléments sociaux, technologiques et historico-culturels présents dans toute activité de formation.

THEORIE DE L'ACTIVITE • APPRENTISSAGE COMBINE • ENSEIGNEMENT SUPERIEUR • TECHNOLOGIE

TEORÍA DE LA ACTIVIDAD: FUNDAMENTO PARA ESTUDIO Y DISEÑO DEL BLENDED LEARNING

Resumen

El propósito es explorar la teoría de la actividad como referente teórico interdisciplinar adecuado, donde se sitúan los elementos sociales, pedagógicos y tecnológicos del blended learning en la educación superior, considerando que la adopción y efectividad del blended learning lo han constituido en el nuevo normal, en el actual contexto de presencia y uso intensivos de tecnologías digitales en educación. Se concluye en la validez internacional de la teoría de la actividad y su permanente transformación y evolución histórica desde sus orígenes hasta la época actual, ofrece transcender el carácter individual hacia un carácter colectivo, representando adecuadamente los elementos sociales, tecnológicos e histórico-culturales presentes en toda actividad formativa.

TEORÍA DE ACTIVIDAD • APRENDIZAJE COMBINADO • EDUCACIÓN SUPERIOR • TECNOLOGÍA

THE INTEGRATION AND INTENSIVE USE OF DIGITAL TECHNOLOGIES, IN PARTICULAR WEB-BASED ones, have been transforming universities worldwide in the last three decades (DUART; MENGUAL, 2015; BOELEN; VOET; DE WEVER, 2018; DZIUBAN *et al.*, 2018). Media-rich digital learning platforms, personalized or adaptable courses and web conferencing tools, capable of connecting students to synchronous distance activities, are becoming common solutions for blended learning (BL) learning projects (ALEXANDER *et al.*, 2019). Technology has the potential to increase access to education, improve learning experiences and reduce the cost of providing high-quality post-secondary education (PROTOPSALTIS; BAUM, 2019).

The adoption of BL has been growing actively in higher education worldwide (GRAHAM, 2014; SPRING; GRAHAM, 2017). Some researchers conclude that BL would become the “new traditional model” (ROSS; GAGE, 2006), or the “new normal” in higher education (NORBERG; DZIUBAN; MOSKAL, 2011), making it almost impossible to find a teaching system and learning that do not involve BL teaching methods (MONTEIRO; MOREIRA; LENCASTRE, 2015). Martín-García, Martínez-Abad and Reyes-González (2019) confirm that many universities and higher education institutions are developing strategic plans to implement and disseminate the use of BL. This trend is confirmed in the study by Alexander *et al.* (2019), in which BL projects are constantly increasing as a favorite modality, valuing their flexibility, ease of access and sophisticated multimedia integration. Several experts claim that blended was an “inevitable conclusion”, and not necessarily a trend, identified as such in the past fifteen years in the *Horizon* study (ALEXANDER *et al.*, 2019).

In this scenario, we face the challenge of addressing this emerging context in educational institutions, based on their possibilities for change and research, from a theoretical and methodological perspective that addresses the complexity and multidimensionality of new realities. For this, we will first investigate the possibilities offered by the BL modality in learning, whose rich emergence is generated by technological advances, for which the educational institution was not able to remain oblivious, given the presence in the daily life of many expressions of technology. We will conduct a review of the use and benefits offered by the dynamic activity theory (AT) to understand how to learn and research with technology, based on the historical assessment of its three generations, to offer at the end of the article a scheme of use of applied AT to BL.

DEVELOPMENT

BLENDED LEARNING CONCEPT

In a recent study, Bartolomé, García-Ruiz and Aguaded (2018) note that in the academic literature in Spanish between 1995 and 2016, the English term BL prevails. Likewise, Furletti and Da Costa (2018) and Da Roza, Da Rocha Veiga and Da Roza (2019) conclude that the Brazilian academic community converges on the use of the term BL, more than other terms and expressions, such as hybrid teaching, hybrid education, hybrid learning or semi-presential modality. In this study, we will use the English expression BL generically.

Regarding its meaning, publications in different latitudes offer a number of uses and meanings of BL, with an emphasis on different focuses, and bring together many training initiatives, such as the combination of traditional face-to-face teaching methods and online or distance learning (BARTOLOMÉ, 2008; PICCIANO; DZIUBAN, 2007; MONTEIRO; LEITE; LIMA, 2013). Other meanings

highlight learning activities that involve a systematic combination of face-to-face interactions and technologically mediated interactions between students, teachers and learning resources (BERSIN, 2004; BLIUC; GOODYEAR; ELLIS, 2007; GRAHAM, 2006; JONES, 2007); that optimize the resources of the classroom and the virtual environment (CUBIDES SALAZAR; MARTÍN-GARCÍA; 2014) and, in the words of Monteiro, Moreira and Lencastre (2015), a face-to-face learning model enhanced by technologies; where there is a confluence of pedagogical and technological mediation, with learning activities that continue the presence through the virtual (TURPO; HERNÁNDEZ, 2014); or in which the simple use of virtual spaces occurs for students to carry out individual or group activities to support the classroom, where they are all managed (BARBERÀ, 2008; CHI; CANUL; CARRILLO, 2019; DUART; GIL, 2008; OSORIO GÓMEZ; DUART, 2012).

The mix of different approaches to learning is not a new idea; for example, conferences, seminars, tutorials, case studies, role playing, learning groups etc. they are heterogeneous procedures and techniques, used simultaneously, in the same educational environment. The difference between BL and this situation is that, in this case, the face-to-face class is combined with variable applications of digital technology, as complex as the “digital learning platforms”, generating a formative continuum that mixes the two modalities (DUART; MENGUAL, 2015).

In summary, agreeing with Martínez (2012) and Picciano, Dziuban and Graham (2014), although there is no consensus on a clear definition of BL, however, in all use cases, the guiding thread is the combination or integration of the modality in-person and in-person education based on Information and Communication Technologies (ICT), whose common denominators are classroom or classroom interaction and online support through the use of various technologies. The objectives and the pedagogical aspects in the integration of both components make the difference between one or the other conception, which reflects how the BL modality is multiform, according to the use that users, teachers and students give it. Therefore, as concluded by Da Roza, Da Rocha Veiga and Da Roza (2019), the BL does not exclude one educational modality due to the other; on the contrary, it proposes that we increasingly use the potential available in each modality so that meaningful learning occurs through effective practices.

EFFECTIVENESS OF BL

As for the effectiveness of BL, there are good academic results in terms of lower dropout rates (PEREIRA *et al.*, 2007; LÓPEZ PÉREZ; PÉREZ LÓPEZ; RODRÍGUEZ ARIZA, 2013) and greater academic performance, with different degrees of statistical significance of the BL modality in comparison to traditional presence (MOREIRA; MESA; AFONSO, 2008; CAMPBELL *et al.*, 2008; CABERO ALMENARA; CEJUDO, 2009; CARRANZA ALCÁNTAR; CALDERA MONTES, 2018; ESSAM, 2010; GEORGE-PALILONIS; FILAK, 2009; HALVERSON; GRAHAM, 2019; HUN LIM; MORRIS; KUPRITZ, 2007; LI *et al.*, 2014; LÓPEZ PÉREZ; PÉREZ LÓPEZ; RODRÍGUEZ ARIZA, 2013; PEREIRA *et al.*, 2007; RUIZ, 2007; RIENTIES; TOETENEL, 2016), although the positive perception of students in relation to BL courses does not always reflect an improvement in learning outcomes (SAJID *et al.*, 2016). The evaluation of these results tends to be done through traditional tests, which do not always value other skills that could be achieved in BL and that are not achieved only with the classroom. The power of the new tools and modalities must be measured according to their particularities. As Bigum and Rowan (2004) point out, it is like testing the power of traction of cars by joining plows. Therefore, the need for a theoretical approach that broadens the scope of the intended results when implementing BL is reinforced.

In its particularity, we can understand the BL as a highly complex communication process that promotes a series of interactions that incorporate technological resources in the presence and contactless moments and that integrate the social and educational components (MONTEIRO; MOREIRA; LENCASTRE, 2015). Therefore, for the adoption of BL as a formative continuum between

classroom and non-classroom, certain conditions are necessary in the combination of different teaching approaches: a) an instructional design that integrates classroom and non-classroom spaces; b) interactive and accessible educational materials; c) a system of continuous monitoring; and d) a continuous and integrated evaluation system (DUART; MENGUAL, 2015; MARTÍN-GARCÍA; MARTÍNEZ-ABAD; REYES-GONZÁLEZ, 2019).

Since the outbreak of the BL revolution, a new world of didactic interactivity appears, in which new forms of teaching and learning must be conceived, studied and understood in their interactions with new media and learning contexts (BARTOLOMÉ *et al.*, 2018). These new learning contexts and environments generate learning communities that facilitate and sustain learning, promoting interaction and collaboration and building a sense of belonging among members, key elements of BL's success, in which a dynamic process must take place, flexible and adaptable (LÉVY, 2009). It is in this context that we need research models and didactic design based on theoretical supports that explain the totality of the new reality that we can generate with the implementation and intervention of the BL, so that it simultaneously covers multiple perspectives of the BL as a technological tool, didactic strategy, modality learning, interaction and communication system and pedagogical approach.

EXTENSION OF AT USE

AT, according to Engeström (2010, 2013), is not only a psychological theory, but an interdisciplinary approach relevant to all social and human sciences, integrating researchers from the most diverse scientific areas (philosophy, psychology, engineering, economics and sociology, including medicine). Karanasios, Allen and Finnegan (2018) also highlight how AT has become, in the last twenty years, an international theoretical framework for studying work and social activity in the fields of organization, management, interaction with the human computer, social psychology and education. Thus, this wide range of scientific areas attests to the use and potential of activity theory in all disciplines.

An example of application in various AT disciplines is the training intervention methodology (Change Laboratory) implemented in Iberoamerica. In their study, Querol *et al.* (2019) analyze the experiences developed in several countries in several areas: Argentina, in promoting literacy skills at a university; Brazil, in a university hospital, in inclusive education at school, in the construction of an airport and a university health center; Chile, in a school; Costa Rica, with the use of ICT in a university; Spain, through multilingual practices in several schools; Mexico, teaching and learning English at a university and running a hospital.

The duration of interest and the increase in AT as a theoretical reference for some decades are also reflected in several publications, in very different fields. Jonassen and Rohrer-Murphy (1999), based on the review of a set of investigations, note that AT provides a different lens from other theories to analyze learning processes. It is clarified, according to Sandars (2005) and Jaworski *et al.* (2012), the importance that AT has been acquiring, for its contribution that offers an integrative vision as a method to analyze and understand human learning, together with the understanding of the tensions and motives underlying the activity as a whole. On the other hand, Karanasios, Allen and Finnegan (2018) value how AT has become a contemporary social theory to study work and social activity. In addition, AT recognizes the importance of cultural influences, and that the activity takes place within a social system.

USE OF AT IN EDUCATIONAL RESEARCH

AT offers a conceptual framework in which we can place the social, pedagogical and technological elements in the implementation of BL in the same unit of analysis, called activity. When we use a tool, such as technology, or when the teacher incorporates innovations, AT becomes a structure of pedagogical intelligibility (GARCÍA DEL DUJO; MARTÍN-GARCÍA, 2002). The activity helps to fully identify the elements needed to explain how a workgroup or learning community

learns in the context of higher education or organizational learning in the administration area (QUEROL; CASSANDRE; BULGACOV, 2014). In this context, AT provides a robust framework for analyzing professional work practices and offers a systemic and multidimensional approach that includes psychological motives and all types of tools, as well as the ever-present dynamics of power, resources, culture and history (FOOT, 2014).

In order to review a set of investigations that use AT as a theoretical reference, we will be guided by the Eight Steps Model proposed by Mwanza and Engeström (2003) to analyze a learning activity within the scope of AT, which can facilitate and guide the grouping of research according to its different emphases on the analysis and development of learning activities both in planning and evaluating them.

First, research that mainly focuses on the technological component predominates, although in AT it is understood that technologies as tools cannot be studied in isolation. There is a tendency to study teaching-learning systems with the support of technologies in their respective contexts, such as when the researcher explores how the use of new technologies affects educational practice (MURPHY; MANZANARES, 2008) and the concerns that arise in the teacher to incorporate them into your practice (KARASAVVIDIS, 2009).

We are verifying that AT is an adequate reference when situations arise that involve groups of people who carry out activities mediated or facilitated by technological support, such as BL. Several researchers address the possibilities of collaborative learning that generate various technological tools, such as technological platforms (GROS; GUERRA; DE RIVERA, 2005); the effectiveness of using mobile technologies to support learning (ZURITA; NUSSBAUM, 2007); use of GeoGebra software in learning mathematics (BARHOUMI, 2015; JAWORSKI *et al.*, 2012); the pedagogical integration of Facebook to generate a cognitive scaffold (RAMBE, 2012); the use of multimedia television in the pedagogical practices of teachers (BIANCHESSI; MENDES, 2019).

On the other hand, other researchers have studied the interactions generated in learning situations (SCANLON; ISSROFF, 2005), the cognitive processes and the role of the mediation of tools in the teaching of mathematics, as well as the mediating role of technologies (BARAN; CAGILTAY, 2010) selected and used intentionally by the teacher and students. About this mediating role of technologies, Méndez and Lacasa (2015) analyze how certain technological instruments (such as the use of video games at school) introduce new practices that contradict those that teachers and students perform in traditional classrooms. In the same sense, Da Cunha and Souto (2018) analyze how the didactic design of a BL course for continuous teacher training caused contradictions among the participants, resulting in movements that point to a break in the encapsulation of this training.

To analyze the elements involved in carrying out an activity, Sam (2012) and Asghar (2013) agree with the double valuation of AT, which, on the one hand, offers a new conceptual framework to comprehensively study the nexus of people, technology and online community, and, on the other hand, it is an adequate means to design or ways of remodeling to improve the interactions and design of activities, achieving a change in teaching and learning practices. This same double assessment is also considered by Kaatrakoski, Littlejohn and Hood (2017), who investigate educators' learning behavior when learning to use open educational resources in their practice and to explore the professional educational challenges they face when changing their practice. AT was used by Vásquez (2016, 2017) to integrate a set of pedagogical models in a BL pedagogical project, organized didactically around learning activities to develop increasing degrees of autonomy for higher education students, in areas of general education, social sciences, computer science, telecommunications and mathematics.

Several surveys focus on learning-related objectives. AT can be an extremely useful tool for the development of reflective practice, a key component for improving learning in real contexts in which technological tools are used (MURPHY; MANZANARES, 2008; BARROS; VÉLEZ; VERDEJO, 2004);

assessment of the effectiveness of using mobile technologies to support learning with WhatsApp (BARHOUMI, 2015); the evaluation of programs aimed at increasing the participation of poorly prepared students in higher education, considering not only the individual variables in student performance, but also the activities and processes that shape the learning environment (KIZITO, 2015); in the virtual learning experience in the teaching of mathematics (RAMÍREZ; JUÁREZ; REMESAL, 2012).

Another key element of AT is the community that performs the learning activity. Mazzoni and Gaffuri (2009) study the new social relationships established with technological networks, whose focus is expanded by Tocaimaza-Hatch (2015), incorporating the analysis of behavior and reflections on some of their reasons, needs and objectives, materializing in concrete actions during the task. For their part, Miranda Díaz and Tirado Segura (2013) apply AT in the generation of virtual learning communities. Timmis (2014) seeks to understand the complex interrelationships between discourse, actions and the community; Haruzuan *et al.* (2014) and Rantavuori, Engeström and Lipponen (2016) propose AT as a conceptual and methodological framework for understanding and studying collaborative learning generated in the learning community.

AT was also used to understand the implementation of e-learning solutions. In particular, Mwanza and Engeström (2003) highlight the sensitivity that AT offers as a theoretical reference for analyzing specific conditions and concrete priorities at the macro (economic and political forces) and micro (teaching and learning) levels in the incorporation of technology use modalities in institutional contexts. Robertson (2008) agrees to find in AT a common language for institutional analysis at the macro and micro levels of the community.

For Barret-Tatum (2015), AT allows us to understand the power of each teacher in building learning opportunities and how they interpret and apply the rules in the introduction of learning patterns and assessment of a central administrative system. This is how Ali, Joyes and Ellison (2015) propose to researchers to consider using the third generation activity system to develop a theoretical framework for the study of BL, as it can provide important information about activities online and in the classroom, in the relationship between the activity system itself and the system that allows BL.

EVOLUTION OF AT

So far, we have seen the growth and importance that BL and AT have gained as a theoretical framework that allows the design and analysis of BL based on its complexity. We will analyze in depth the evolution of AT since its origins. To characterize the different moments of its dynamic evolution and limit the contributions of theorists, we will use the distinction of the three generations of AT established by Engeström (1987, 2001, 2010).

The first generation is based on Vigotsky's idea of cultural mediation (1979). Vigotsky conceives that every human action of the individual is mediated by instruments and oriented towards certain objects, an idea that is part of one of the three nuclei of Vigotsky's theoretical structure. In the words of Wertsch (1988), mental processes can only be understood by understanding the instruments and signs that act as mediators. The other two themes at the core of the theory are the belief in the evolutionary genetic method and the thesis that higher mental processes have their origin in social processes.

The second generation, largely inspired by Leontiev's work, according to Wertsch (1988), is one of the main continuators of Vigotsky's ideas, overcoming the limitation of the first generation of focusing the unit of analysis on the individual. Leontiev demonstrates how the division of labor results in the differentiation between an individual action and a collective activity. Engeström (1987), based on the contributions of Vigotsky and Leontiev, expands the original representation of the activity systems, used by the first generation, to explain the social and collective elements of an activity system, adding the elements of the community, rules and division of labor, highlighting the importance of analyzing mutual interactions.

In the third generation of AT, Engeström (2001) develops the conceptual tools to understand the dialogue, the multiplicity of perspectives and the interaction networks of the activity systems. The purpose of the Engeström model is to transcend the individual character of the activity, towards a collective character, which better represents the social and historical-cultural elements present in all human activity.

FIRST GENERATION OF AT: CULTURAL MEDIATION, VIGOTSKY

In the 1920s, a group of Soviet experts proposed a restructuring of psychology as a science, based on the principles of Marxist philosophy, with the intention of overcoming subjective and idealistic psychology, ending the dissociation of the human psyche as a carrier of social relations. Many years after Vigotsky's death, Leontiev points out that "American researchers are constantly dedicated to discovering how a child becomes what he is; in the USSR, we try to discover not how the child becomes what it is, but how it can become what it is not" (LEONTIEV, 1979).

Vigotsky (1979, 1987) clarified in his work the role not only of activity, but also of communication in the socialization of the individual. He developed the historical-cultural approach to explain the human psyche and the formation of personality based on Marxist philosophy, revolutionizing the psychology of his time and transcending it, currently maintaining full force. Vigotsky and his collaborators highlighted the importance of man's activity, mediated by historical and cultural influences, as well as the role of all this in the formation and development of the human psyche.

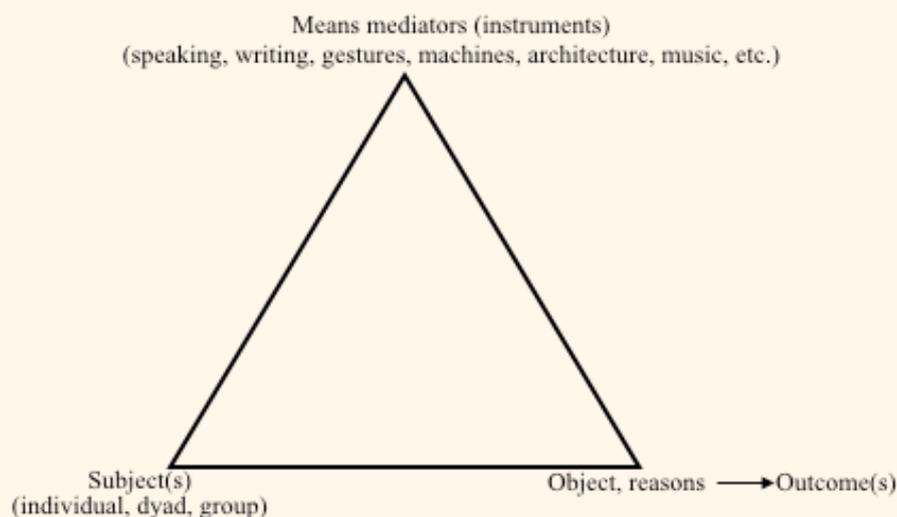
This idea of cultural mediation in the context of Vigotsky's activity (1979) crystallizes it in the triangular model expressed in the triad of subject, object and mediating artifact. The direct connection between the conditioned stimulus (S) and the response (R) by a complex act is transcended. The intermediate link X, interposed between the two, replaces the stimulus in the cultural mediation of actions. Generally, Vigotsky's mediation model is expressed as the subject, object and tools triad. The concept of mediation, according to Wertsch, one of the great scholars of Vigotsky's work, "is the most original and important contribution by Vigotsky" (1988, p. 33).

The material life of man, according to Vigotsky (1979, 1987), is mediated by instruments, and, in the same way, psychological activity is mediated by links produced by social life, in which language is the most important. Vigotsky understood that man's life would not be possible if he had to use only his brain and hands, without the instruments or tools that are a social product. The function of the tool is to serve as a driver of human influence on the object of the activity to lead to changes in the objects. It is a means by which an external human activity is destined to dominate and triumph over nature. Vigotsky, together with his colleagues Luria and Leontiev, proposed that all human activity be motivated by the need to achieve an objective (object, motive) through the internalization of culture's tools and signal systems. The signals belong to the broader category of psychological tools.

According to the approach presented so far in the model of the first generation of AT, the object refers to the "problem" to which the activity is directed by the subject, which is transformed into results through the mediation of influences, internal and external. This means that the objects are no longer just raw material for the formation of operations. Objects have become cultural entities, and object-oriented action has become the key to understanding human limitations. The importance of objects and their mediating influence on actions is a central feature of AT (SANDARS, 2005). In any case, the Vygotskian unit of analysis is limited to individual actions. During this period, studies tended to focus on individuals.

Although the idea of the activity is a contribution as an integrative view, Engeström (1999) shows that the problem with Vigotsky's representation is that it does not fully explain the social and collective nature of individual actions. In other words, it does not represent individual actions as events that are part of a system of collective activities (Figure 1).

FIGURE 1
AT FIRST GENERATION MODEL



Source: Engeström (1999).

Furthermore, the essence of each individual, his personality, is the system of relationships he establishes with those around him. Men interact in a given historical-cultural formation, created by the activity of production and transformation of their reality. Human activity, which allows the development of psychic processes and the appropriation of culture, is always social, implies the relationship with other men and communication between them in culturally organized processes.

SECOND GENERATION OF AT: LEARNING AS AN ACTIVITY, LEONTIEV

Learning, according to Leontiev (1978), is an activity or system of activities. Leontiev (1979) critically analyzes Vigostky's historical-cultural theory, stating that it is not the concepts, but the real activity that unites the organism with the surrounding reality and determines the development of consciousness. He thus began to show the unity of outer-practical activity with inner-psychic activity. He also demonstrated the dependence on internal activity in relation to external activity. In this way, the psyche and the conscience are not only manifested, but are formed in the same activity, the actions constituting the unit of analysis of the learning activity. Wertsch (1988) recognizes that AT is one of Leontiev's greatest contributions, and the concept of activity, the fundamental category of his theory. Leontiev's work on the activity provided an elaboration of the notions of object and objective and the central character of the object for an analysis of motivation. He established that the transformation of the object / objective is what leads to the integration of the elements of the activity system.

Therefore, Leontiev (1978) proposed the idea of activity analysis as a scientific method of human psychology. Leontiev separates the specific types of activity, which can differ from each other, according to several characteristics: their form, the methods for carrying them out, their emotional intensity, their time and space, their physiological mechanisms. The main thing that distinguishes one activity from another is the difference in its objects. It is exactly the object of an activity that gives you a certain orientation, it is your real reason. It is understood that the object or motive can be material or ideal, present in perception or exclusively in imagination or thought.

Thus, the concept of activity is necessarily related to the concept of motivation. For Leontiev (1978), the activity does not exist without a reason, although the subjective or objective reason may be hidden. Likewise, human activity does not exist, except in the form of action or in a chain of actions. For example, the work activity that exists in work actions, school activity in school actions, social activity in society actions.

Then, in the notion of hierarchical structure of the activity defined by Leontiev (1979), he argues that human activity is, in a first phase, directed by an object or motive, which arises from human needs. In the second phase, it generates actions oriented towards objectives or goals, to achieve the object. In the third phase, the objectives are operationalized in various tasks, depending on the context in which they are carried out. Human activity exists only in the form of an action or chain of actions subordinated to a motive. Any concrete process, external or internal, unfolds before us from the point of view of its motivation.

Together, these three levels (activity, action and operation), interrelated, comprise a structure of activity that Wertsch (1993) recognizes as a contribution by Leontiev with great methodological sense. To analyze any activity, it is necessary to identify all actions and operations that support the activity. Activity is the work of the system considered on the most general scale. As we move through this hierarchy, the scale of analysis becomes smaller and more specific. Once the level of operation is reached, work becomes routine, even unconscious.

Note that there are often no differences between the terms action and operation. In the context of psychological analysis of the activity, however, it is absolutely necessary to distinguish between them. Actions, as already mentioned, are related to objectives or goals, the instruments available for action and operations are driven by conditions, that is, by the circumstances of the moment. Suppose the objective remains the same, the conditions under which they are assigned, regardless of whether they are changed, so that only the operational content of the action is changed. Operations are the means by which the action is performed (LEONTIEV, 1978).

SECOND GENERATION OF AT: COMMUNITY INTER-RELATIONS, ENGSTRÖM

Although Leontiev overcomes the limitation of the first generation, which remained focused on individual analysis, he does not graphically expand the original model of a system of collective activities. This new modeling is done by Engeström (1987). It extends the original triangular representation of the activity systems used by the first generation, in which it tries to represent the social/collective elements of an activity system, adding the elements of the community, the rules and the division of labor. With this, it intends to examine the mutual interactions of the activity systems at the macro, collective and community level (bottom of Figure 2), instead of focusing exclusively on the micro level, of the individual actor or agent who operates with instruments, or in close intersubjective relations of the links face to face in micro-contexts (upper part of Figure 2).

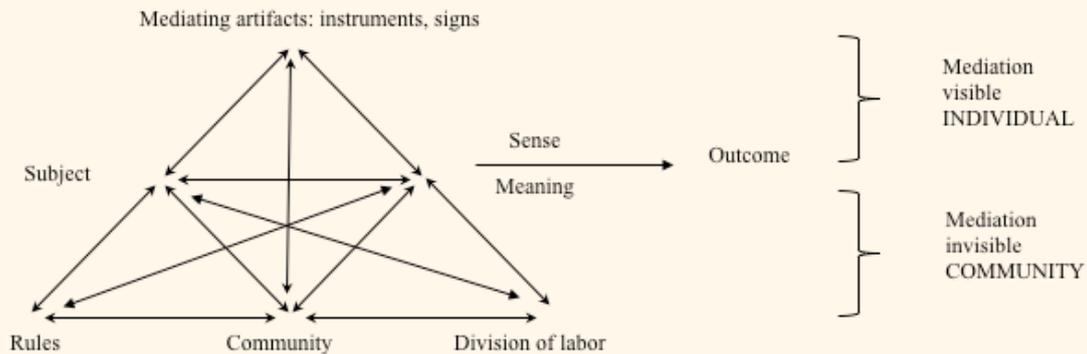
The relevance of this second generation of AT is that it focuses on the interrelationships between the subject as an individual and his community. At the same time, it highlights the importance of contradictions in activity systems as a driving force for change. Learning and conscious knowledge emerge from activity (performance), and not as a precursor to it. Its unit of analysis focuses on the interaction of human activity and awareness within its relevant environmental context.

Therefore, knowledge as images of objects, phenomena, actions of the material world never exists in the head of man outside of any activity, outside of some actions. Following the principle of activity and separating action as a unit of analysis, knowledge is included in the action structure from the beginning. When occupying the structural place of the object of the action or being part of the content of the guiding fundamentals or constituting the objective of the action, knowledge goes through the same stages of the activity as a whole.

This AT representation reveals that there are several mediations in a system of activities. The subject and the object, or the actor and the environment are mediated by instruments, including symbols and representations of various types. This triangle, however, according to Engeström (1999), is only “the tip of an iceberg”. The less visible social mediators of the activity (norms, community and division of labor) are shown at the bottom of the model (Figure 2). Among the components of the system, there are continuous transformations. The system of activities is constantly being rebuilt.

Participation in the activity implies changes in the living conditions and identity of the subject in action and its associated objects. People build small-scale reality models to understand, explain and anticipate events. Engeström (1987) has already argued that interest in mental models has increased in recent decades; as they are dynamic and modifiable, they can generate descriptions of a system of activities, both in terms of form and purpose, as well as of their operation. They also provide predictions about the future states of an activity system.

FIGURE 2
MODEL OF THE SECOND GENERATION OF AT AND LEVELS OF MEDIATION



Source: Engeström (1987, 1999).

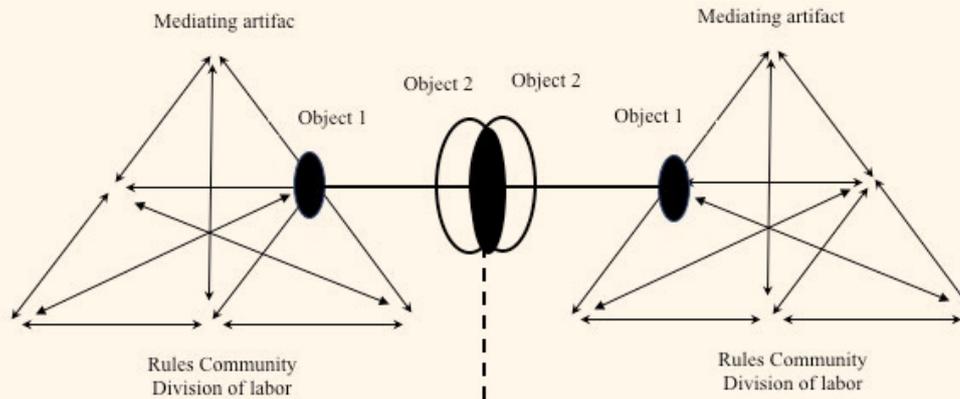
THIRD GENERATION OF AT: ACTIVITY SYSTEM, ENGESTRÖM

The third generation of AT adds to the perspectives of the previous two generations the integration of the development of conceptual tools to understand the dialogue, the multiplicity of perspectives and the interaction networks of the activity systems. In this generation, research extends to activity networks. According to this approach (ENGESTRÖM, 2001), the activity is a collective and systemic formation with a complex mediating structure.

This system of activities produces actions and develops through actions; however, the activity is not reducible to actions that are relatively ephemeral and have a specific beginning and end in the time of individuals or groups. Activity systems, on the other hand, evolve over socio-historical periods of time, taking the form of institutions and organizations, articulated by objects.

Graphically, the activity system in the model scheme describes the role of the object with the help of an oval figure (Figure 3) which indicates that object-oriented actions are always explicit or implicitly characterized by ambiguity, surprise, interpretation, understanding and potential of change (ENGESTRÖM, 1999). At the same time, Engeström (2013) highlights the importance of contradictions in activity systems as a driving force for change and development. Engeström points out that, in Russia in the 1930s, the social activity systems studied by activity theorists were limited to playing and learning among children, since the contradictions of collective activity constituted a difficult topic to address in this socio-context. historic.

FIGURE 3
MODEL OF THE THIRD GENERATION OF AT



Source: Engeström (2001).

This idea of contradictions in activity systems as a driving force for change and development has been taken up and recontextualized by Western researchers since the 1970s. New areas of activity, including work, have been focused on concrete research. But, from the fundamental work, the historical-cultural approach remained a discourse of vertical development towards higher psychological functions. Cole and Engeström (2001) show that the second generation of AT remains insensitive to cultural diversity. The third generation of AT develops conceptual tools to understand the multiple perspectives and horizontal networks of activity systems.

Thus, the third generation of research formulated by Engeström (2001) uses two activity systems as a minimum unit of analysis, which makes it possible to study inter-organizational learning processes, capturing tensions and contradictions that occur in intra and interactivity systems, aspects not addressed by the second generation.

BL AS A SYSTEM OF ACTIVITIES

When we apply AT to the educational field, and in particular to BL, the role of the teacher as a mediator is, first of all, to offer students favorable conditions for learning, the occasions to practice the existing schemes, that is, the way of acting and better control operations, the possibility of automating a certain part of what has been learned; second, to develop new schemes, that is, new concepts, new rules of action for objectives and tasks that are still uncommon.

An orientation guide for the teacher in the context of AT is presented by Jorba and Casellas (2001) based on the mechanisms that lead to self-socioconstruction of knowledge in the BL; for this, students need to reach agreements on aspects such as:

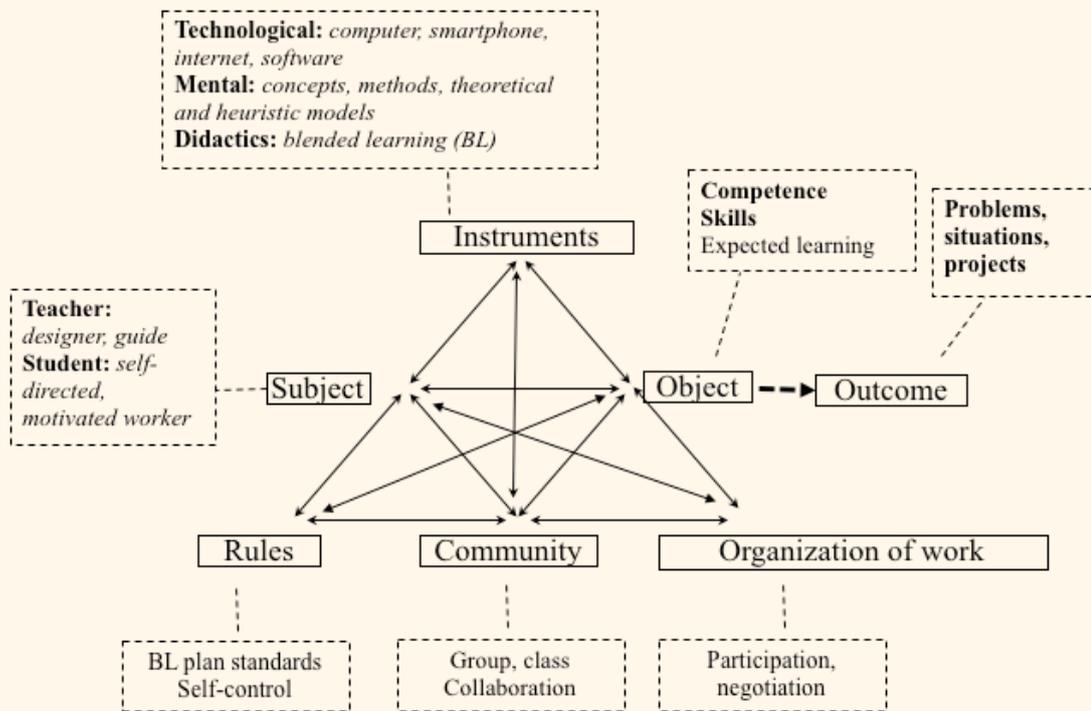
- The clarity of the problem, recognizing where it applies, where it is projected and some idea of the possible solutions (diagnostic evaluation and representation of the objectives).
- The plan (in person and online) to address the accepted solution as possible to be carried out by the group members.
- The execution of the plan, permanently checking (controlling with the use of technologies) if the actions performed provide a solution structure for the problem (relationship and restructuring of the concepts known with the new concepts).
- The development of feedback processes to correct and guarantee the solution's approach. In other words, ensuring that the evaluation criteria to be used to regulate the application and generalization of what is learned in the partial solution of the current stage are shared in comparison with what is expected to be learned in the next stage.
- The chain coordination of the steps defined in the plan until the end is achieved in a self-regulating and successful manner.

The set of guides and guidelines described reflects the main interest of AT in mediating the activity by a specific type of artifact known as a mental model. All people have beliefs and opinions about their world and understand the individual's mental models (ROTH *et al.*, 2004; SANDARS, 2005). From these mental models, the teacher can articulate the students' commitment, which, according to Halverson and Graham (2019), is correlated to the BL with important educational results, including academic achievements and satisfaction.

Figure 4 shows the AT applied to the BL. The dimensions that integrate it are: the projected and executed learning activity, teachers and students as participating subjects; the different tools available and those used by students and teachers, the formation and functioning of the learning community, rules and regulations existing in the learning community and the division of labor established in the learning activities.

We agree with Protopsaltis and Baum (2019) that we have strong evidence that emphasizes the critical role of frequent and meaningful interaction between students and teachers to increase the quality of the BL's educational experience and improve learning outcomes and student satisfaction.

FIGURE 4
AT APPLIED TO BL



Source: Author's own elaboration, adaptation of Engeström (2001).

FINAL CONSIDERATIONS

AT is a dynamic theory that, since its origins, is in constant transformation, renewing its interest and usefulness to understand the learning processes with the use of information and communication technologies, since it focuses on the analysis of mediation instruments and mechanisms of social interaction that configure the activity systems of the subjects in the BL.

It is necessary to overcome a simplistic approach and incorporate problematizations that guide research and allow us to understand the dynamic interaction between learning and technological possibilities in BL (GROS, 2016). AT allows us to advance in the use of new methods

and instruments of research and didactic design of how the subject interacts in an expansive way with other subjects mediated by technology in the scope of an BL activity, through the application of the expansive cycles of the activity at the level of individual, in the case of teachers and students, according to the analysis structure provided by Engeström (2001, 2009, 2010) in the third generation of AT. An expansive cycle is a new orchestration of these expressions from the different points of view and perspectives of the participants in the learning community.

AT highlights the historical contradictions that activity systems accumulate as sources of change and development, understood as open systems that, when introducing new technologies or models such as BL, cause contradictions that open the possibility of innovative actions of change, given the lack effective knowledge of the BL systems verified by Martín-García, Martínez-Abad and Reyes-González (2019).

Finally, in relation to pedagogical and didactic conditions of on-line activities and you witness non-BL collaborative work, TA offers conceived ferramentas to understand how to cognize and redistribute between forms of close and distant joint activities and how it is given or thought among individuals. (between processes) and within them. So much or understanding is not something external, but it is molded by the activity that is done. A way to relate to learning or learning is through practical activities. By way of agir and understanding it is intertwined with activity, and that is the basic context of understanding. As we learned about our social and practical activities in a community, they serve as a filter through which you perceive or that works as a reality.

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