

Conceptions about learning and its relationship with pedagogical practices

Concepciones sobre el aprendizaje y su relación con las prácticas pedagógicas

María Rocio Malagón Patiño ¹

¹ Colombian. Inter-Institutional Doctoral Student in Education. Francisco José de Caldas University, Colombia. E-mail: rmalagon@sena.edu.co

Received: 04- 03 - 2018 Accepted:10-05-2018

How to cite: Malagón Patiño, M. R. (2018). Conceptions about learning and its relationship with pedagogical practices. *Informador Técnico*, 82 (1), 108-119. doi: <http://doi.org/10.23850/22565035.1391>

Abstract

Pedagogical practices have been the subject of multiple studies, and sometimes strong criticisms and pressures, given their relationship with the learning achieved by students, the professional development processes of teachers, and even by their role in the implementation of new curricular policies, among other incidents. This article, as a contribution to the study of pedagogical practices, exposes the arguments of some theoretical perspectives to explain learning, with a strong or weak relationship with the school and the classroom in particular. To achieve this, a map will be drawn between four perspectives: as a transmission of knowledge, as a processing of information, as a social, cultural and historically situated construction and from a sociopolitical perspective. But, what is the importance of recognizing different perspectives to explain learning in the study of pedagogical practices? Initially, two reasons are proposed: firstly, avoid assuming learning as a transparent, non-problematic factor, that is, can you study pedagogical practices without considering learning as a source of conflicts, decision making, or even the need for changes? or transformations in them? question debatable if it is assumed that learning is a fundamental aspect of any human practice. Second, avoid assuming that there is only one truth in the face of learning and from it, interpreting and making decisions in relation to pedagogical practices. The article initially exposes arguments from the written discourses of a specific educational context the SENA National Learning Service - to subsequently present the bets from the literature of research in the field. It is intended, in short, to generate contextualized theoretical elements for the discussion of the topic, mainly in the professional development programs of the professors.

Keywords: learning; teaching; pedagogical practice; constructivism; knowledge construction.

Resumen

Las prácticas pedagógicas vienen siendo objeto de múltiples estudios, y a veces fuertes críticas y presiones, dada su relación con los aprendizajes alcanzados por los estudiantes, los procesos de desarrollo profesional de los profesores, e incluso, por su papel en la implementación de nuevas políticas curriculares, entre otras incidencias. Este artículo, como un aporte al estudio sobre las prácticas pedagógicas, expone los argumentos de algunas perspectivas teóricas para explicar el aprendizaje, con fuerte o débil relación con la escuela y el aula de clase en particular. Para conseguirlo, se trazará un mapa entre cuatro perspectivas: como transmisión de saberes, como un procesamiento de la información, como una construcción social, cultural e históricamente situada y desde una perspectiva sociopolítica. Pero, ¿cuál es la importancia de reconocer diferentes perspectivas para explicar el aprendizaje en el estudio de las prácticas pedagógicas? Inicialmente se proponen dos razones:

en primer lugar, evitar asumir el aprendizaje como un factor transparente no problemático, esto es, ¿se pueden estudiar las prácticas pedagógicas sin considerar el aprendizaje como fuente de conflictos, toma de decisiones, incluso, de necesidad de cambios o transformaciones en ellas?, cuestión discutible si se asume que el aprendizaje es un aspecto fundamental de cualquier práctica humana. Segundo, evitar asumir que existe una sola verdad frente al aprendizaje y desde ésta interpretar y tomar decisiones en relación con las prácticas pedagógicas. El artículo expone en un principio argumentos desde los discursos escritos de un contexto educativo específico - el Servicio Nacional de Aprendizaje SENA - para, posteriormente, presentar las apuestas desde la literatura de la investigación en el campo. Se pretende, en resumen, generar elementos teóricos contextualizados para la discusión frente al tema, principalmente en los programas de desarrollo profesional de los profesores.

Palabras clave: aprendizaje; enseñanza; práctica pedagógica; constructivismo; construcción del conocimiento.

Introduction

The pedagogical practices have been defined in multiple ways in educational research, but a coinciding element in any assumption is that the conceptions and beliefs that teachers have about how students learn are one of its essential components. On this basis the teachers make decisions and manage the activities in the classroom, evaluate the learning achieved, determine the routes to follow when there are difficulties, among other scenarios of incidence on this conception.

In fact, from different scientific disciplines, the problem of learning has been addressed. The studies in the framework of these disciplines provide theoretical and methodological elements that are specifically incorporated into the knowledge that circulates in the school or in the classroom, configure tools to think and define actions that contribute to the achievement of student learning, and even of the same teachers.

In this article, four perspectives are exposed to approach the subject, without discounting that there are other diverse ways to do it. This form of organization is an analytical mechanism whose purpose is to generate elements for reflection and discussion with teachers and others interested in the topic within the educational community, becoming at the same time a pretext that leads to actions against the construction of knowledge. pedagogical about it.

Learning from Piaget's genetic epistemology

In principle, it is assumed that Piaget's genetic theory of learning, with wide influence in the decades from the '60s to the '80s, constitutes a theoretical instrument to inquire about these processes in the classroom, as well as other theories that they support the structure of this article.

This position of learning is considered epistemological, in as much, the question is in how the subject advances in the knowledge of the world, through interactions on him, that allow a progressive construction of notions and forms of thought more and more structured. In short, the theoretical underpinnings are located in psychological areas that bet on a dual, direct and indissoluble relationship between the action of the knowing subject (individual, internal) and the object of knowledge (external). Here, the elements of the context or of the culture exist, but they do not configure learning; as Coll explains:

While it is true that Piaget insists again and again on the need to take into account others and social institutions in the explanation of development, it is undeniable that social factors are not for him, in any case, formative or structuring mechanisms (1988, p.5).

Internally this position is coherent. Although considering that the world is only accessible through the interactions of the subjects with it, then it is not possible to think of an independent world and outside of the results of these actions.

This attitude towards learning has been deeply rooted for decades in educational institutions, some as part of their oral culture and others as documentary media. In this second case, we find several records of the National Learning Service SENA). For example, Barrera and Lora (1976), in a reference document for professional training in this institution, states that:

The essence of learning does not consist then in mechanically repeating texts of books, nor in listening carefully to the instructions, but in the “intensive mental activity” to which the students dedicate themselves in the direct handling of the data of the subject. (p.45).

Explicitly the relation subject knowing - actions on the world (object of knowledge). In another document of this same institution, Bustos (1986) proposes a development of didactic strategies that account for the factors that cause the passage from a lower level of knowledge to a higher one, alluding to this genetic epistemology; the physical experience, the social experience, the conflict or imbalance between the new facts, the previous conceptual schemes and the processes of maturation within the subject who knows, are these factors. Later, in another institutional document it is defined that: “The learning process implies the understanding, assimilation and application of knowledge, abilities, skills and attitudes that make the person competent (...)” (SENA, 1997), explaining later that “assimilation, is the process of internal representation of knowledge in people; and the application, is the possibility to identify, pose and solve problems through the knowledge assimilated” (p.32), in coherence with the same position that has been spinning against learning.

To conclude, an institutional document of the last years that states:

The theories expounded by Jean Piaget on learning as a process of knowledge construction of an internal, active and personal nature are the characteristics of Constructivism and constitute the starting point in SENA, in order to structure the conception of knowledge of Integral Vocational Training (FPI) (SENA, 2015, p.19).

In the Piagetian style, this text infers the responsibility of the student in the construction of his setup knowledge. An advance in this point is the fact of not considering the “transmission” of knowledge as a possibility of teaching, since this is not something that someone builds or possesses and passes on to another, knowledge is the result of experience personnel with a narrow margin of the intervention of “the others” and of the culture and its artifacts in the process, is a type of “personal possession”; This last scenario leaves a reduced line for decision-making and the teacher’s action in classroom practices (Tynjala, Mason, and Lonka, 2001, 2001).

In short, with the quotes exposed, it is evident how institutional discourses continue to privilege the same positions in relation to teaching and learning for more than 40 years, regardless of whether educational research advances, the pedagogical policies are transformed and the institution itself generates internal changes in their pedagogical practices. In the next section, another perspective is addressed to learning that allows us to advance in the conceptualization proposed in the article.

Learning seen as a result of information processing

Although it is rare to find literature from the perspective of information processing where the problem of learning is explicitly addressed, and less in the field of school practices, in some cases it is associated with studies of memory (short-term, long-term, associative, among others), therefore, related to the mental functions of the subjects. For example, Pozo (1989) describes it in relation to symbolic operations (coding, comparing, storing, etc.) that account for human intelligence and especially, the ability to build knowledge.

The *processing of information*, as a possibility to explain the functioning of reasoning and the construction of human knowledge, has been developed from the “cognitive science”. Gardner (1987) states: “I define cognitive science as a contemporary empirical basis for responding to ancient epistemological questions, particularly those related to the nature of knowledge, its component elements, its sources, evolution and diffusion” (p.twenty-one).

The core of this science is the relationship (analogy/metaphor) between human reasoning and artificial computer systems. Although not all experts accept the model of the mind as a computer, there is a large number of those who defend it or at least have accepted its influence (Gardner, 1987). In this direction, Vasco (1993) explains the difficulties presented by this metaphor, given that, for example, it privileges the individual over the social, the cognitive versus the affective, and the intellectual over the psychomotor, but recognizes that “the more they refine the programs that pretend to simulate the behaviors considered as intelligent, more clearly the differences between the computers thus programmed and the way children, adolescents, and experts proceed” (p.10). On the other hand, some critics of this criticism highlight the relationship that has been shown between fuzzy logic (computing) and aesthetic appreciation, or even the role of culture in cognition seen as processing (Vásquez, 1991).

Thus, in the last two decades, cognitive science has strived to distance itself from the classical posture that prevailed in its early years, a position that privileged an individual cognition, of internal models and representations, situating it now in a complex and changing, delocalised world of the individual or the individual, extending it and distributing it in the components of the world though as a system (social, for example), incorporating the body, the environment and the situation in this new space of cognition (Bedia and Castillo, 2010).

On the other hand, although there is no explicit agreement on what are the sciences or disciplines that are part of cognitive science, the same term “cognition” implies knowledge achieved through the exercise of mental faculties, therefore, psychology has a natural and indisputable role in this science. In addition, the information expressed in the founding analogy between the cognitive functions of people (including those related to learning) and the mechanisms of information processing in computational devices, demand their participation; in fact, artificial intelligence has managed to build computational artifacts that behave or think intelligently, under the assumption of giving answers comparable to those that people would give in certain circumstances or facing certain problems, these artifacts arriving, for example, self-learning correcting their own mistakes or the creation of pieces similar to art (pieces of poetry or music); the question now is the role that human sensitivity and culture play in this comparison with artificial intelligence.

However, other sciences such as philosophy, neurology, anthropology, and linguistics also play an important role in cognitive science (Gardner, 1987, Vásquez, 1991, Vasco, 1993, Fierro, 2011, Ramos, 2014). Over time, new areas formed by two or more fields such as neurophysiology or neurolinguistics have been incorporated, together with sciences that were unthinkable to initially locate them as sociology or economics, and that, by assuming cognition as an external process subject, gives them their prominence.

Although, in the previous perspective, learning was framed in a dual relationship (apprentice action on the object of learning), in cognitive science it continues to be an internal and individual process, now focused on the forms of reasoning and creation and communication of knowledge, with a current key question: how does “human intelligence” produce these reasonings, knowledge and forms of communication? What if this product can be achieved, or even overcome, by an artificial brain? the answers to this question will definitively change the purposes of the school in the coming decades. In the following section, we review the view of learning from a delocalized perspective of the mind, no longer as a transmission or as a subjective construction: the sociocultural perspective.

Learning as a socially and historically situated construction

A different view of learning is in sociocultural theories. The acceptance that human faculties are developed through the participation of subjects in social practices (Lave and Wenger, 1991; Lave, 1996; Rogoff, 1997; Rodríguez and Alemán, 2009; Lave, 2009a; Lave 2009b; Lave, 2010) or through joint work with others (Radford 2013, 2017), are key premises in this perspective. In this new scenario, the duality subject-object of knowledge is changed by a more complex network of actors, means or resources and relationships.

For Lave and Packer (2011), learning is conceived as a social construction, that is, as an aspect of participation in historically and culturally situated social practices, with the intervention of the subjects in the experiences of a community, in such a way that manages to become a member and participate in its production. They affirm that: “a much more serious, broad and profound vision of learning is possible when we start from the recognition that it has its roots in practice, and in being, rather than in knowledge” (p.19). From this statement, it can be inferred that transcending the concern for teaching, the fundamental thing is the social process that takes place in the classroom and that allows professors and students to negotiate their participation in the practices and in the production of knowledge.

The above means that learning is more than participating in the activities of the communities to which the student belongs, it is the construction of subjectivities and identities with respect to those communities. In fact, in the same way, Wenger (2001) states that participation transcends the commitment with certain activities or people, having a greater scope:

[...] consisting of participating in an active way in the *practices* of the social communities and in constructing identities in relation to these communities. For example, being part of a gang during recess or being part of a work team is at the same time a type of action and a form of affiliation. This participation not only shapes what we do but also shapes who we are and how we interpret what we do (p.3).

The learning thus considered is an aspect of the dynamic participation of people in changing practices. In this regard, Rogoff states: “During learning newcomers to a community of practice progress in their skills and understanding through participation in culturally organized activities” (1997, p.4), that *progress* is the object of learning itself. From this perspective, learning is considered as:

The reconstruction of the way in which a subject is involved with the world, in such a way that the subject is reconfigured, and, at the same time, there is a reconfiguration of the production and reproduction of objects, be they texts, other people, events social or institutions. (Lave and Packer, 2011, p.21).

In this scenario, learning can not be separated from the context of the situations where it develops. Who makes up the collective (group), where and when the practice takes place, the discourses they share about the world, among other aspects, determine the historical, social, cultural and even psychological relationships that are present and shape the learning. That is, situations and learning are mutually constituted.

From another perspective from the socio-cultural perspective, Radford (2013) points out that the aims of education should aim at students becoming “someone” within the community, in addition to “knowing” something. To understand the notion of learning within the framework of Theory of Objectification, Radford’s theoretical commitment, it is necessary to specify three key concepts: knowledge, activity, and consciousness. Because it is even in these concepts that Radford’s criticism of the position of learning as an aspect of “participation” in social practices held by Lave, Wenger, Rogoff, in line with this perspective, is understood. They were already mentioned in this article. This eminently social position, critics Radford (2017), does not completely abandon the Piagetian position of learning as an adaptation, only that in this case it is an “adaptation to social practices”.

For Radford, knowledge is not an object that can be transferred, or possessed by someone, knowledge is a “codified system of corporeal, sensitive and material processes of action and reflection constituted historically and culturally” (2017, p.102). The so-called corporeal, sensitive and material as a way of saying that it is not a cognitive, mental or internal. Knowledge thus understood is the historically and culturally codified synthesis of ways of reflecting and acting in response to certain specific problems. But, from this same direction, it is through the activity (historically and culturally situated) that individuals produce knowledge. That is, knowledge is not a Platonic matter of general truths, it is the product of joint activities of cultural production.

To differentiate the concept of *activity*, as used by other theoretical currents, Radford (2013, 2014, 2017) changes it to the Hegelian term of *labor*. For this researcher, the work is more than the satisfaction of basic needs, “[...] it is a *social form of joint action* that includes notions of the expression of the subject that works” (2014, page 6). At a conference in Barranquilla, he exclaimed “Work is not just doing or producing something. The work has a foundational dimension in the production of human existence, in the production of each one of us and our lives” (2013).

From the theory of objectification, knowledge has two dimensions: in its potential form and in its current form. Initially, knowledge is the power or capacity to do something. In this state, knowledge exists as a product in culture, but, for example, in school, it is not yet the subject of thought or interpretation on the part of the student. Only and through the development of joint teacher-student activities, is that knowledge becomes actual, it is not the only possibility, now the student becomes aware of that knowledge and works with it. It is in the joint action of the professor and the students that space is given to take cognizance in a collective way of the historically constituted knowledge. Now, in its current state, knowledge can be the object of thought and interpretation on the part of the student “The transformation of knowledge into an object of consciousness is what we call learning”, says Radford (2013).

A product of the nexus between the concepts of knowledge and labor in the Theory of Objectification is the conception that assumes the teaching and learning process. From here, this process is a unit through which we will produce knowledge (objectification) and constitute subjects (subjectification). There are then no teaching activities directed by a teacher apart from the learning activities developed by some students, they are a single activity where the subjects are constituted in a mutual way (Radford, 2014). From this position, to speak of pedagogical practices is to speak of a joint effort and joint construction of meanings not only among students but between students and professors, the professor becomes a teacher in the pedagogical practice and the student is configured as such in the same practice. D’Amore complements:

When we say that the action of the teacher and the student are not “two actions” but that it is “the same action”, we find precisely this point of view; the work, what is produced, the person who produces it, the various agents, are all components in unison of a single activity that, with a single word, we can call the work (2015, p.6).

Thus, in contrast to the previous cognitive positions, from this theoretical position, we can speak of a teaching and learning process, with the development of joint activities that enable a permanent transformation of subjects and the collective production of knowledge. Overcomes duality: internal - external.

Learning in the framework of a sociopolitical perspective in the classroom

When considering, as Aristotle did more than two thousand years ago, that politics has to do with authority, government and power, one could initially affirm that a sociopolitical perspective of education puts the disputes arising from the conflicts on the table of discussion. unequal power relations in the school and in the classroom and that end not only defining the learning achieved by the students but also the subjectivities and identities of the students and professors who engage in such practices, as we will try to argue in this pulled apart.

Specifically, the close relationships between the teaching and learning processes and the social, political and historical structures where they are developed should be considered. Paraphrasing Valero (2002), incorporating the image of the teacher and the student as political subjects, not only cognitive, allows to consider teaching and learning as a sociopolitical activity that is created and recreated in various spheres of social action that involve, in addition to the context of the classroom, the social, economic, political and cultural structures where it is inscribed. To delve into this perspective it is recommended to read Foucault (1982), Gorgorió and Planas (2000), Bernal and Martín (2001), Valero (2012), among others.

The issue in question is how much brings education, and classroom practices in particular, to the construction of spaces that allow students and teachers to act and interact in contexts of collective production of knowledge and subjectivities, but also of equitable intervention in different orders of society, from the political, the economic, the scientific, without differences of class, race or gender.

As it was stated in the previous section, in various places of social and educational research an individualistic conception of learning has been transcended, placing it in the social or cultural-historical terrain, but it is common for pedagogical practices to follow revolving around the individual and the individual with a predominance of a homogeneous disciplinary knowledge as a learning goal, with universal apprentices, leaving out the possibility of an education for more democratic or inclusive societies.

From a sociopolitical perspective of education, Ball and Tayson (2011) raise the need to prepare teachers to take on the challenge of providing learning environments where the vulnerable reality of young people is visible today and where they are offered growth experiences to address the forms of inequality, apparently insoluble, that must live in their daily lives. The interesting thing about this bet is what type of teacher training is needed, given that, say the researchers, this does not go through only the pedagogical or didactic, but recognizes the need to involve fields such as public health, community psychology, social epidemiology, and medical sociology, among others; given a more medicalized than social output to this problem.

Ball and Tayson (2011), expose the high complexity of pedagogical practices in classes with young people who, as they claim, live in "socially toxic environments" as a result of racism, poverty, gender discrimination, among other forms of oppression. A child or young person who is subjected to multiple forms of violence (physical or institutional) or to visible inequalities (social or economic), will not be able to leave that condition when he/she crosses the doors of the school or the classroom, that is a situation to the that the teacher must be receptive; seen thus, one can not think of universal learning with students from the ideals of academic success, nor in practices with homogeneous or conflict-free environments, scenarios that presuppose the cognitive perspectives of learning.

The above context may be misinterpreted as the search for justifications for poor teaching or for the failure of students. Contrary to this, the challenge is to provide teachers with skills so that they can offer classroom experiences that generate hope for young people to be able to counteract these difficulties. Freire expressed it in his *Pedagogy of Hope*:

"Without a minimum of hope we can not even begin the attack, but without the onslaught, hope, as an ontological need, becomes disordered, twists and turns into despair that sometimes lengthens in tragic despair. That is why it is necessary to educate hope" (1993, p.19).

For Freire (1993) it is required not only that teachers identify and study the conditions of oppression that their students live, but also demand pedagogy to offer courses that allow school scenarios to develop and evaluate educational projects that respond to these conditions. In the same way, the challenge is not only in the design of learning tasks but also in the formation of forms of discussion and interaction in the classroom that promote possibilities of "ruptures" of the *status quo* where new ways of constructing worlds can be filtered. possible for these students. As Ball and Tayson say:

“Eventually, many students come to perceive a significant gap between their most pressing needs and the things being emphasized in the schooling these educators offer them (test scores, grades, college). When they figure out that the teacher is unwilling or unable to close this gap, their hope that school would be relevant in the context of their everyday lives is deferred” (2011, p.317).

The text serves as an argument to reiterate that a sociopolitical perspective of education, such as the one described in this last section, focuses on the need to consider the specific daily environment of students (racial, social, cultural and linguistic diversity, mainly) in the classroom context, transcending homogenizing postures and therefore excluding against learning and assuming, unlike, that these environments are constitutive factors of them. This perspective, with special emphasis on the nature of the required teacher training, can be completed with readings by Freire (1972, 1994), Bartolo and Smyth (2009), Burns and Shadoian-Gersing (2010), García and Valero (2013), García and Romero (2018), among others.

From a perspective related to the above, Popkewitz (1994, 2006) questions the possibility that the school has in itself for the construction of more just and inclusive societies. It is confronted with the hopeful purpose given to the school to form a child or young thinking, attentive and reflective, but at the same time coexists with the fear that exists of not achieving it, product of the impediments that arise from the participation of “others” students outside the conditions considered suitable for learning and good school performance; those “others” are precisely called “students at risk or disadvantage” because they come from populations in extreme poverty, black people, disabilities or dysfunctional families. These conditions by themselves exclude them from the tacit label of “normal students” and therefore they require a special, remedial, “repair and rescue” treatment since they are different from those that have “natural” motivational or cognitive attributes to achieve school success. In this regard, he exclaims: “The practice of teaching and learning builds a continuum of values that compare, divide and simultaneously exclude as much as they include” (Popkewitz, 2006, p.5).

In this order of ideas, in the Colombian case, Valoyes (2017) claims the scarcity of studies that address how situations of inequity due to gender, class or race conditions are installed in classroom practices in the country and less, to deal with to understand the reasons for the failure in learning of historically marginalized students. According to this researcher, the official discourses anticipate the failure of the poor students by granting them an essentialist character or “inherent to the social identities of the students” (p.4), which, according to her, frees the State from its responsibility in front of this phenomenon. In that order of ideas, but from the educational policies, Dussel denounces:

“We think this review is even more urgent when the response that the school articulates to those excluded is limited to thinking about new motivation strategies, new tests to detect and classify behaviors, or new segregation techniques for those who emerge as conflictive. The hegemony of educational psychology, in a particular version that essentializes these developments, has depoliticized and drastically epistolized the issue of inclusion and exclusion, arguing that the only thing educators should do is find technical solutions and institutional designs [sic]. updated curricula” (2000, p.19).

As a conclusion, it is based on what is written in this section that the sociopolitical perspective does not determine definitions or ways to describe learning or pedagogical practices, as expressed by Valero (2013), this perspective (specifically in Mathematics Education) is:

“... a set of research that takes elements of anthropological, sociological and philosophical theories to address problems defined in the relationships between the different practices of mathematics and the functioning of mechanisms of power -and therefore of inclusion and exclusion- in the society” (p. 7-8).

The definition that can be useful not only for research in a particular training area, also allows us to understand the perspective in the educational, social and political apparatus in general. To expand more on the subject, it is suggested to review Gentili (2002), García (2015, 2016), Valero (2017), Popkewitz (2010), Valoyes (2015).

Final reflection

A scenario such as the one that marks the 21st century, with innumerable sources of information, with technological developments that impact the daily routines of any community and that, in turn, transform personal, social and professional roles, should lead to educational authorities and teachers to generate proposals in accordance with this vision. Propelling by orderly, silent class scenarios, where the individual work prevails, the explanatory voice of the teacher prevails in return for the creative and imaginative action of the apprentices integrated into joint tasks, it is possible that it is discordant with the period.

A change in the exposed line has the SENA. As it was shown in the documentary records, in the institution the concept of learning seems to prevail as an individual and internal process, but the reality is different. For several years it has been recognized in the institution that: (1) the sources of information are abundant, wide and changing, (2) collaborative work is the main source of development of human faculties (SENA, 1985, Article 2), in the direction that Radford proposes on *labor* and that was exposed in this article, (3) the activity of the apprentice is the vehicle for the development of their competences and (4) the context is a structuring and constitutive source of learning. One materialization of this assumption is the change, at an almost general level, of individual positions for apprentices through collaborative work tables and multi-technological learning environments. It is common to observe today in the institution, from the strategy of training by projects, the collective work between apprentices and apprentices with their instructors.

Finally, two aspects to mention. The first is related to the purpose of the article, reiterating that it is located in a minimum coherence between pedagogical practices and the underlying conception of learning, with a background context: the social and cultural realities that live in and outside of the school. A teacher will be able to positively value an orderly class, with a high student discipline, where silence and individual work are privileged. There is an immersion in learning as explained in the first two perspectives. But for another teacher, it will be necessary that there be a broad collective dynamic in the classroom, with permanent debates, with groups of students developing different activities, that even have the autonomy to influence the management of the class, etc., as demarcate the last two perspectives. In both cases, the teacher is expected to be aware of this conception of learning, its scope and limitations, as a way of interpreting the events that occur or even transform it when necessary.

A second aspect is the restrictions and conditions imposed by the school institution in these relationships. Teachers are not individual subjects, they are subjects of a community: the educational institution, which implies that a high percentage of what is promoted in the classroom is determined by the institutional culture. The decision and action margin is reduced and, therefore, when studying the teaching practices that they promote, one must also study the institutional culture in this regard.

In conclusion, it is a broad and complex panorama to understand the pedagogical practices and their impact on the learning achieved or not. It is, therefore, open to reflect on this relationship from the teacher's professional development processes or from research in the field.

References

- Ball, A. F. y Tyson, C. A. (eds.) (2011). *Studying diversity in teacher education*, Washington, D.C.: American Educational Research Association
- Barrera, M., y Lora J. (1976). *Metodología de la Formación: Fundamentos generales*. Servicio Nacional de Aprendizaje – SENA. Colombia.
- Bartolo, P.A., y Smyth, G. (2009). Teacher education for diversity. In A. Swennen, & M. van der Klink (Eds.), *Becoming a teacher educator* (pp.117-132). Netherlands:Springer. doi: https://doi.org/10.1007/978-1-4020-8874-2_9

- Bedia, M. G., y Castillo Ossa, L. F. (2010). Hacia una teoría de la mente corporizada: La influencia de los mecanismos sensomotores en el desarrollo de la cognición. *Ánfora*, 17(28).
- Bernal, A. O., y Martín, J. P. (2001). La dialéctica saber/poder en Michel Foucault: un instrumento de reflexión crítica sobre la escuela. *Aula abierta*, (77), 99-110.
- Burns, T., y Shadoian-Gersing, V. (2010). The importance of effective teacher education for diversity. OECD (ed.), *Educating Teachers for Diversity. Meeting the Challenge* (pp. 19-40). OECD Publishing. doi: <https://doi.org/10.1787/9789264079731-4-en>
- Bustos, F. (1986). *Estrategias didácticas para la formación profesional*. Servicio Nacional de Aprendizaje – SENA. Colombia.
- Coll, C. (1998). La teoría genética y los procesos de construcción del conocimiento en el aula. En JA Castorina, C. Coll y otros, *Piaget en la educación. Debate en torno a sus aplicaciones*, México, Paidós.
- D'Amore, B. (2015). Saber, conocer, labor en didáctica de la matemática: Una contribución a la teoría de la objetivación. In L. Branchetti (Ed.), *Teaching and learning mathematics. Some past and current approaches to mathematics education* (pp. 151–171). University of Urbino Carlo Bo: Isonomia. Recuperado de <http://isonomia.uniurb.it/epistemologica>
- Dussel, I. (2000). *La producción de la exclusión en el aula. Una revisión de la escuela moderna en América Latina*. Conferencia presentada en X Jornadas LOGSE. Granada, España.
- Fierro, M. (2011). El desarrollo conceptual de la ciencia cognitiva. Parte I. *Revista Colombiana de Psiquiatría*, 40(3). doi: [https://doi.org/10.1016/S0034-7450\(14\)60144-X](https://doi.org/10.1016/S0034-7450(14)60144-X)
- Foucault, M. (1982). The subject and power. *Critical Inquiry*, 8(4), 777-795. doi: <https://doi.org/10.1086/448181>
- Freire, P. (1972). Education: domestication or liberation? *Prospects*, 2(2), 173-181. doi: <https://doi.org/10.1007/BF02195789>
- Freire, P. (1993). *Pedagogía de la esperanza: un reencuentro con la pedagogía del oprimido*. Siglo XXI.
- Freire, P. (1994). *La naturaleza política de la educación*. Planeta-Agostini.
- García, G. (2015). Aproximación a los procesos de exclusión e (in) exclusión en el aula de matemáticas. In *Avances y realidades de la educación matemática* (pp. 55-72). España: Graó Editores.
- García, G. (2016). Prácticas culturales de consumo: limitaciones y posibilidades en la movilización de la relación diversidad, educación matemática y subjetividades juveniles. *Educação Unisinos*, 20 (3), 339 – 347.
- García, G. y Romero, J. (2018). Matemáticas para todos en tiempos de la inclusión como imperativo. Un estudio sobre el programa Todos a Aprender. *Revista Colombiana de Educación*, (74), 289-310.
- García, G., y Valero, P. (2013). *De la igualdad, la equidad y la (in) exclusión en el currículo de matemáticas: una revisión en el contexto colombiano*. In: *Procesos de inclusión/exclusión: Subjetividades en educación matemática* (1 udg., s. 17 – 2). Bogotá, Colombia: Universidad Pedagógica de Colombia. Fondo Editorial.
- Gardner, H. (1987). *La nueva ciencia de la mente: historia de la revolución cognitiva*. Barcelona, España: Editorial Paidós.

- Gentili, P. (2002): *La exclusión y la escuela: el apartheid educativo como política de ocultamiento*. Ponencia presentada el 20 de setiembre en el Paraninfo de la Universidad de Sao Paulo. Brasil.
- Gorgorió, N. y Planas, N. (2000). Researching multicultural classes: A collaborative approach. In J.F. Matos & M. Santos (Eds), *Proceedings of the Second International Mathematics Education and Society Conference*, (pp. 265-274). Lisboa: Centro de Investigação em Educação da Faculdade de Ciências da Universidad de Lisboa.
- Lave, J., (1996). "Teaching, as learning, in practice." *Mind, Culture and Activity*, 3(3), 149-164. doi: https://doi.org/10.1207/s15327884mca0303_2
- Lave, J. (2009a). The practice of learning. *Contemporary theories of learning: Learning theorists... in their own words*, 200-208. Recuperado de: <https://pdfs.semanticscholar.org/1085/b8aaeee9d65dccbe930dca5fe6034bbaeb4d.pdf#page=209>
- Lave, J. (2009b). Fait sur mesure. *Techniques & Culture*, (1), 180 - 213. Recuperado de: <http://journals.openedition.org/tc/4644#entries>
- Lave, J. (2010). Math lessons from Liberia. *Anthropological Theory*, 10 (1-2), 186-191. doi: <https://doi.org/10.1177/1463499610365385>
- Lave, J., y Packer, M. (2011). Hacia una ontología social del aprendizaje. *Revista de estudios sociales*, (40), 12-22.
- Lave, J., y Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. New York, EEUU: Cambridge University Press
- Popkewitz, T. S. (1994). Política, conocimiento y poder: algunas cuestiones para el estudio de las reformas educativas. *Revista de educación*, 305, 103-137.
- Popkewitz, T. (2006). La escolaridad y la exclusión social. *Anales de la educación común*, 2(4), 78-94. Recuperado de: http://servicios.abc.gov.ar/lainstitucion/revistacomponents/revista/archivos/anales/numero04/ArchivosParaImprimir/8_popkewitz_st.pdf
- Popkewitz, T. S. (2010). Inclusión y exclusión como gestos dobles en política y ciencias de la educación. *Propuesta Educativa*, (33), 11-27.
- Pozo, J. I. (1989). *Teorías cognitivas del aprendizaje*. Madrid, España: Ediciones Morata.
- Radford, L. (Octubre, 2013). *La enseñanza – aprendizaje desde una perspectiva histórico-cultural: la teoría de la objetivación*. Ponencia presentada en 14° Encuentro Colombiano de Matemática Educativa, Barranquilla, Colombia.
- Radford, L. (2014). De la teoría de la objetivación. *Revista Latinoamericana de Etnomatemática, Perspectivas socioculturales de la Educación Matemática*, 7 (2), 132- 150. Recuperado de: <http://www.revista.etnomatematica.org/index.php/RLE/article/view/123>
- Radford, L. (2017). Aprendizaje desde la perspectiva de la Teoría de la Objetivación. En *Enseñanza y aprendizaje de las matemáticas: problemas semióticos, epistemológicos y prácticos* (pp. 115-134). Bogotá, Colombia: Editorial Universidad Distrital Francisco José de Caldas.
- Ramos, L. A. (2014). Psicología cognitiva e inteligencia artificial: mitos y verdades. *Avances en Psicología*, 22 (1), 21-27.

- Rodríguez, W. C., y Alemán, A. A. (2009). El enfoque sociocultural en el diseño y construcción de una comunidad de aprendizaje. *Revista electrónica actualidades investigativas en educación*, 9, 1 - 21.
- Rogoff, B. (1997). Los tres planos de la actividad sociocultural: apropiación participativa, participación guiada y aprendizaje. *La mente sociocultural. Aproximaciones teóricas y aplicadas*, 111-128. Recuperado de: http://www.terras.edu.ar/biblioteca/6/6TA_Rogoff_Unidad_5.pdf
- Servicio Nacional de Aprendizaje. (1985). *Unidad Técnica*. Bogotá: Colombia.
- Servicio Nacional de Aprendizaje. (1997). *Estatuto de la Formación Profesional Integral*. Bogotá: Colombia.
- Servicio Nacional de Aprendizaje. (2015). *Proyecto Educativo Institucional*. Bogotá: Colombia.
- Tynjala, P., Mason, L., y Lonka, K. (Eds.) (2001). "Writing as a Learning Tool" Presented at the annual meeting of the American Educational Research Association, April 10--14, Seattle, WA
- Valero, P. (2002). Consideraciones sobre el contexto y la educación matemática para la democracia. *Cuadrante*, 11 (1), 33-40.
- Valero, P. (2009). Entre la realidad y la utopía: investigación socio-política en educación matemática. *Escenarios de aprendizaje de las matemáticas*, 18 - 29.
- Valero, P. (2012). Perspectivas sociopolíticas en la educación matemática. En P. Valero y O. Skovsmose (Eds.), *Educación matemática crítica: Una visión sociopolítica del aprendizaje y enseñanza de las matemáticas* (pp. 195-216). Bogotá: Ediciones Uniandes.
- Valero, P. (2013). *Investigación en educación matemática, currículo escolar y constitución de la subjetividad*. Trabajo presentado en VII CIBEM, Montevideo, Uruguay.
- Valero, P. (2017). El deseo de acceso y equidad en la educación matemática. *Revista Colombiana de Educación*, (73), 97-126. doi: <https://doi.org/10.17227/01203916.73rce97.126>
- Valoyes Chávez, L. (Junio, 2015). *Racial and class tensions in Colombian mathematics classrooms*. Conferencia presentada en 8th Mathematics Education and Society, Portland, Estados Unidos.
- Valoyes Chávez, L. (2017). Inequidades raciales y educación matemática. *Revista Colombiana de Educación*, (73), 127-150. doi: <https://doi.org/10.17227/01203916.73rce127.150>
- Vasco, C. E. (1993). La metáfora del cerebro como computador en la ciencia cognitiva. *Revista Informática Educativa*, 6 (2), 109 - 119.
- Vásquez, G. (1991). La pedagogía como ciencia cognitiva. *Revista Española de Pedagogía*, 49(188), 123-146. Recuperado de: <http://www.jstor.org/stable/23764358>
- Wenger, E. (2001). *Comunidades de práctica: aprendizaje, significado e identidad*. Barcelona, España: Paidós.