THEORETICAL DEFINITIONS AND RESEARCH AREAS PROPOSED FROM CONSTRUCTIVISM, IN LATIN AMERICAN PUBLICATIONS OF PSYCHOLOGY AND EDUCATION IN DATABASE REDALYC

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ABSTRACT

This paper aimed to provide an updated summary of theoretical tendencies and research areas proposed from constructivism, in Latin American journals of psychology and education published during last ten years. For that, we explored the database REDALYC, which is considered as one of main Latin American open-access repository, with full text articles linked to psychology and education. First, we analyzed the epistemological assumptions of constructivism. Then, directly related to psychology and education, we reviewed central aspects and internal theoretical distinctions of this perspective. Finally, we identified some research topics studied from constructivism in psychology and education, in explored database. These were grouped into three areas: teaching and learning strategies, science teaching, and incorporation of TICs into teaching and learning process.

Keywords: Constructivism, Education, Latin America, Psychology, REDALYC

Introduction

This article is aimed to provide an up-to-date synthesis of the theoretical guidelines and areas of research related to constructivism, in Latin American journals of psychology and education present in REDALYC database. The same, created and driven by the Autonomous University of the State of Mexico (UAEM), is one of the main Latin American open access repositories, with availability of complete articles related to the area of psychology and education. This basis was not only selected for the previous reason, but also by the specific characteristics of their Advanced search engine, which made it possible to optimize the strategy of inquiry and the relevance of the relevant texts for this work.

As the focus of this review was referred to Latin American publications, the results relating to the articles of European magazines were omitted (read Spain and Portugal). On the other hand, the basic criterion for the selection and location of the work consisted of indicating the virtual platform some specific terms («constructivism and constructionism») to facilitate the location of those jobs related to our interest. This procedure should necessarily apply to delimit and clarify the results, since otherwise the information processing is significantly hindered.

The epistemological change: General aspects

Constructivism is the result of a paradigmatic crisis in the mid-20th century, which radically transformed the way of conceptualizing the physical and social reality, knowledge, the scientific method, among other things (Gonzalez Rey, 1997). In short, the traditional approach had conceived to reality as an unequivocal order that existed irrespective of a cognoscent subject, which was meeting in terms of more or less adjusted to that level of external representations. The advance of interdisciplinary convergence questioned deeply these epistemological bases, reversing the relationship between the observer and the physical and social reality. From this new perspective, the alleged reality is not knowable in itself, since any form of knowledge is determined by the characteristics of the subject. In this sense, the world is not conceived as an area to be copied, but it can only be interpreted according to the same Act of knowledge.

For the purposes of clarifying and specifying in greater detail the differences raised between both approaches is the proposal of Neimeyer (1998), from table 1:
In relation to the realistic approach, if you are based on the assumption that the world is knowable in itself and that we can access that reality directly, the validity or falsehood of the statements is based on the extent in which these correspond to that order regardless of what the observer said. In this sense, the knowledge will progress cumulatively from the progressive discovery of new laws of universal character or nomothetic. From this point of view, even though theoretically the concept of meaning to explain human knowledge is accepted, it is understood basically as a mediational activity, i.e. a logical translation of qualities existing in an external order to the subject, taken to the mental or individual level. In this process, the language is the main tool of cumulative Association of such meanings.

On the contrary, already in relation to constructivism, knowledge is conceived as an active process in which the inherent structure of the observer is imposed on a so-called external order, which is inaccessible in itself. All cognitive operation relies on a system relatively autonomous with respect to what could be understood as reality, until you reach the end (in some cases) seeing reality as a mere explanatory argument. For this reason, the validity of knowledge already is not based on a criterion of correspondence (as raises the realism), but by the achievement of viable and consistent explanations with internal consistency raised by the system of subjective knowledge. In this sense, while in the process of knowledge construction it is intended to generate new ideas and meanings on the world, others and the self, the criterion of regulation is always in function of maintaining a basic level of consistency with a system of personal meaning (individual or social) rather than conform to an external reality, of inaccessible nature. This process of constant structure overtaking of meaning across a foreign order is what is understood as pro-activity (Mahoney, 1991). More moderate or radical interpretations of this prior idea will lead to different approaches to staying inside of Constructivism.

Constructivism in psychology and education

Constructivism has its oldest roots in philosophy from the pre-Socratic, Sophists, and Stoics (Araya, Alfaro & Andonegui, 2007), passing through the key influence of Kant in modernity (Londoño, 2008) culminating in the developments of the 20th century, among which we can mention, according to Chadwick (1999), the works of Baldwin, Dewey, Piaget, Vygotsky, Bruner and important researchers and theorists. In this review we have identified different works in psychology and education in which we tried to delimit the common features that unify Constructivism as a theoretical category. In all the texts analyzed the general defining elements were more or less similar, beyond that some have been presented in more detail and more globally. Based on that, consistent with one of the main objectives of the text, consisting of presenting a brief idea of these characteristics, it was decided to quote the work of Perez Cubero (2005), because that was what best sums up this set of texts. The author proposed three key elements that summarize constructivism in education. First, a basic epistemological framework of relativistic cut, where knowledge is understood as a subjective construction, for example, dependent on the characteristics of the observer, surpassing the realistic perspective (either in its rationalistic version or empirical) which traditionally marked to the West.

.. the constructivism proposes an alternative to the concept of knowledge and know, in which knowledge is not an object or a finite target (Bauersfeld, 1995), but an action or a process of social and located building. The process of knowing, then, is conceived and described on the basis of its functional, distributed, interactive and contextualized character (Perez Cubero, 2005, p. 45).
Theoretical definitions and research areas proposed from constructivism, in Latin American publications of psychology and education in database Redalyc

Table 1
Epistemological contrasts selected among the Objectivist approach and the constructivist approach in Psychology (Neimeyer, 1998, p. 33)

<table>
<thead>
<tr>
<th>Course</th>
<th>Objectivist</th>
<th>Constructivist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature of Knowledge</td>
<td>Representation or copy of the real world.</td>
<td>Construction of the experience and action of the subject.</td>
</tr>
<tr>
<td>Validation of knowledge</td>
<td>Theory of the correspondence of the truth; true equality between the demands of knowledge and the real-world as we are revealed through the senses.</td>
<td>Theory of the coherence of the truth; search for a viable knowledge through social consensus and internal consistency.</td>
</tr>
<tr>
<td>Nature of truth</td>
<td>Unique, universal, ahistorical, on the rise.</td>
<td>Multiple, contextual, historical, paradigmatic.</td>
</tr>
<tr>
<td>Goal of science</td>
<td>Unifying; Discover the nomothetic laws.</td>
<td>Pluralistic; creation of local knowledge.</td>
</tr>
<tr>
<td>Scientific method</td>
<td>Prescriptive; emphasis on the quantitative measurement and controlled experimentation.</td>
<td>Anarchic; emphasis on qualitative methods and the hermeneutic analysis of the narrative.</td>
</tr>
<tr>
<td>Vision of the human being</td>
<td>Reactive; «map» of events and real relationships; mediational.</td>
<td>Proactive; ‘plan’ to organize the activity; predicative.</td>
</tr>
<tr>
<td>Basic unit of meaning</td>
<td>Concept or scheme to assimilate knowledge based on similar inherent characteristics.</td>
<td>Construct or distinction to establish meaning through contrast.</td>
</tr>
<tr>
<td>Relationships between meanings</td>
<td>Associative; Cognitions such as isolated self-affirmatives or rules based on past contingencies.</td>
<td>Systemic; constructions hierarchically sorted in a self-organized structure.</td>
</tr>
<tr>
<td>Role of language</td>
<td>Average social reality; system of signs.</td>
<td>Builds the social reality; system of differentiations.</td>
</tr>
</tbody>
</table>

Secondly, consistent with the above, the subject is regarded as an active agent in the construction of knowledge. Although the meaning of this idea can be interpreted in different ways according to the different perspectives to the interior of the psychological or pedagogical constructivism (which will be later analyzed), in global terms refers to the overcoming of the conception of a student passively receiving knowledge transmitted by the school environment. Finally, it is proposed that the knowledge not only constitutes an active process, but which, in turn, is inseparable from the sociocultural and historical specific context which gives it meaning.

Although those traits common to any constructivist approach in psychology and education, have been identified as it deepens its analysis shows, at the same time, theoretical internal fractures product of the lack of conceptual consensus on certain specific issues. This was evident in the present review when a series of works were located in which the authors suggested a different specific classification systems, beyond recognizing a basic similarity in some epistemological global principles (Araya, Alfaro & Andonegui, 2007; Barreto, Gutierrez, Pinilla & Parra, 2006; Castillo, 2008; Hernandez Rojas, 2008). Although these authors used different names to identify the categories of each classification system, many of them theoretically alluded to the same approach. From this, and with the intention of finding theoretical overlap between the proposed classifications, table 2 was made. The name of the author of each article and the categories proposed in its classification system was placed on each of their columns. Within each column, the categories were arranged so that, subsequently, in the same row listed those equivalent denominations together, beyond having been named in different ways by each author. This was intended to facilitate the display of the above theoretical equivalents. For

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Table 2
Classification systems of constructivist approaches proposed in psychology and education. Equivalences and categorical differences

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Final constructivism</td>
<td>Developmental or evolutionary</td>
<td>constructivism Piagetian</td>
<td>constructivism Cognitive</td>
<td>constructivism Psychogenetic</td>
</tr>
<tr>
<td></td>
<td>constructivism Social</td>
<td>constructivism Socio-cognitive</td>
<td>constructivism Socio-cultural</td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>constructivism Radical</td>
<td>Radical constructivism (Maturana)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Radical constructivism (Von Glasersfeld)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formal constructivism</td>
<td>Social constructivism</td>
<td>Social constructionism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficient constructivism</td>
<td>Constructivism focused on intellectual development (emphasis on scientific content)</td>
<td>Cognitive constructivism based on the ausubelian theory of assimilation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Constructivism focused on the development of cognitive skills</td>
<td>Cognitive constructivism based on the theory of strategic learning</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cognitive constructivism based on the theory of diagrams</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example (see Table 2), the denominations «social constructivism» (Araya, Alfaro & Andonegui, 2007) «socio-cognitive constructivism» (Castillo, 2008) and «socio-cultural constructivism» (Hernandez Rojas, 2008), have been placed in the same row because theoretically they refer to the same constructivist micro-focus, beyond being nominally different.

Below will be a summary characterization of each of the General identified currents in the revised works (detected from equivalent categories). Here the main intention is not to provide a deep description of each approach, but to present an overview of major trends within constructivism, in order to mention the core differentiating aspects. It is considered that it would propose a detailed explanation of each micro-focus exceed the objective of the work. In that sense, each trend recognized would only be described globally, reserving the possibility of deepening the same in the revised articles. Secondly, those «isolated» categories, i.e., that have few conceptual equivalents (for example, «efficient constructivism»), are not included in the following description, since they’re mainly concerned with the most recurrent constructivist approaches in the works cited.

For the purposes of theoretically arranging the differentiation between these approaches figure 1 was made, built on the basis of two classification axes: 1) emphasis on individual/social as psychological analysis unit; (2) moderation or radicalism of the perspective. This last point, according to Fernandez Alvarez (1992, p. 109), can be explained in the following way:

«Radical constructivists lean, briefly, by the failure to assert some degree of consistency in what we call «reality». In its most extreme form, they conclude that it is an invention. The moderate constructivists, on the other hand, think that reality exists, although it is not within our reach to achieve a thorough knowledge of it.»
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Moderate approach

<table>
<thead>
<tr>
<th>Emphasis on individual</th>
<th>Emphasis on social</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final constructivism, developmental, evolutionary, plaigetian, cognitive or psychogenetic (e.g.: Piaget)</td>
<td>Social constructivism, socio-cognitive or sociocultural (e.g.: Vygotsky)</td>
</tr>
</tbody>
</table>

Radical approach

Material or radical constructivism (e.g.: Von Glasersfeld; Maturana)

Formal or social constructivism, or constructionism social (e.g.: Gergen)

Figure 1. Differentiations to the interior of the constructivism

a) final, developmental, evolutionary, constructivism plaigetian, cognitive or psychogenetic

These different names refer to a specific type of Constructivism based mainly on genetic epistemology of Piaget (1926/1975; 1947/2003; 1964/1991). Originally, the main interest of this author was set to explain how the human being achieves a rational and scientific knowledge in the world. Consequently, he proposed to understand the acquisition from an evolutionary process marked by the progressive construction of knowledge structures, which give rise to the differentiation of a series of stages of cognitive development. This evolution involves two basic mechanisms, whose interplay sets the more or less adapted relationship between the individual and the environment: assimilation and accommodation. The development towards more complex and evolved structures of thought assumes a progressive balance between the subject and reality, which allows the passage of the predominance of the mechanism of assimilation on accommodation, toward predominance in the reverse direction (accommodation on assimilation). A clear example of this evolutionary achievement is given by the construction by the child of a surgical or reversible logic among the seven or eight years old approximately; at this stage, even though the individual still supports operations on specific aspects of reality, the principles that govern its logic have almost a complete independence from the elements from the intuitive way. In that sense, the subject is approaching the object from previous cognitive structures, which evolved over time into more logical and abstract forms, up to the characteristics of the scientific knowledge of rational and abstract character.
The distinguishing aspect of piagetian constructivism, in relation to other types to arise later, would be given by the complementation between the following characteristics:

1) A clear emphasis on the individual biological and psychological nature of the process of construction and development of cognitive structures. The progressive development of these and the consequent differentiation in stages, depends solely on a series of endogenous processes, which allow greater or lesser balancing with the environment. Within this theoretical framework, social interaction has a secondary role in the development of cognitive structures, since, although relational exchanges constantly exposed to the subject of perspectives different to their own (decentralization of the own point of view) and the subsequent construction of new schemes of knowledge, the core of the process depends mainly on the individual capacity of balancing the body. In other words, the social dimension is not considered as a causal psychogenetic development factor, but as one scenario that represents an opportunity for the individual progresses in the forms of knowledge construction.

2) Moderate constructivism. While knowledge is an active process of construction through diagrams and internal structures to the subject, it never loses sight of the reference to an external reality. The described interplay between assimilation and accommodation, as well as the balancing as synthesizer process among these, always occurs according to an external environment, beyond of that knowledge represents an elaboration of stimuli according to the logic of the subjective structure. All of the above, means that the piagetian constructivism must be understood as moderate, in contrast to radicals prospects which will be presented below.

b) Social constructivism, socio-cognitive or socio-cultural

This perspective is centered around the Western reading of the work of Vygotsky (1931/1995; 1934/1995), who unlike other models focus on individual aspects of knowledge, proposed to understand the cognitive development based on the historical and socio-cultural context in which the individual performs. Piagetian optics, which insists that the development is mainly caused by endogenous factors, unlike in this case is in intimate relation with the cultural context, which will be acquiring more complexity during the growth (nuclear family, extended family, school and peer, society in general). In these scenarios the individual participates in social exchanges that are the causal factor of cognitive development, while in these fields appropriate tools mediators are issued by culture, those instruments of semiotic character occupy a central role. Precisely, the progressive participation and assimilation of the artifacts provided by the culture is what allows a greater conscious control of the activity and power cognitive processes in order to operate with more and more abstract and powerful forms (Marti, 2000; quoted by Hernandez Rojas, 2008).

According to figure 1, social constructivism is distinguished from other constructivist perspectives by the combination of the following aspects:

1) Emphasis on the social as a unit of analysis: the individual is inserted in a sociocultural context it pre-exists, and gradually internalizes the tools available in the intersubjective spaces, among which language occupies a central place. Semiotic resources granted by the culture, acquired at the heart of these inter-active frames, give the basic keys to the interpretation of the world. Thus, the unit of analysis is no longer the individual (in interaction with their environment and others), but the social relationship in itself, since the understanding of psychological processes must be done within the framework of the socio-cultural contexts in which they are developed.

2) Moderate constructivism: as well as genetic epistemology g, even though it refers to knowledge as a process of building (in this case, granted by the socio-cultural context tools,) and not understanding diagrams generated by endogenous individual changes, always recognized an external order. While it is impossible to have full reality knowledge, because all forms of knowledge is sustained in the cultural codes introjected, it recognizes its ontological status.
c) Material or Radical constructivism

Both this constructivist approach, as well as which will be presented below are versions of radical constructivism, since not only affirms that an objective knowledge of reality (common aspect to all forms of Constructivism) is impossible, but that directly is set aside by the same interest or practically that holds its non-existence. In other words, not only is removed the epistemological status (has a minimal role in the generation of knowledge), but also loses ontological status, unlike piagetian and vygotskyan approaches that kept some reference to an external order, beyond being inaccessible.

The main reference which is based on material or radical constructivism include the contributions of Von Foerster (1984), Von Glasersfeld (1994), Maturana (1999), Maturana and Varela (1972, 1990). Following is an appointment that clearly shows the epistemological heart of this approach:

«We are caught, then, in a paradox. We want to believe that we are able to know something about the external world, but we can never know whether such knowledge is or isn’t true, to establish the truth we should do a comparison that we simply cannot do. We have no way of reaching the outside world if it is not through our experience and to have that experience, we can make the same mistakes; even though we saw it correctly there would be no way of knowing whether our vision is correct (Von Glasersfeld, 1994, p. 18; cited in Gonzalez King, 1997, p. 32)».

As a result, the purpose of knowledge is aimed at giving a sense to the different experiences, in order to organize them (categorizing them, coordinating them, thinking about them), in consistency with the system of knowledge (internal viability) and according to the biological and social place in which the subject is (Hernandez Rojas, 2008).

Following qualifier axis proposed previously, this micro-focus is characterized by:

1) Emphasis on the individual (biological and psychological) as the unit of analysis. According to Maturana and Varela (1990), the knowledge is conceived as the own capability of all organisms to organize their internal order in the first place, to then attach themselves to the environment. This process is exclusively governed by the need to maintain its internal laws, rather than correspond to an external order.

2) Radical constructivism. It is not possible to appeal to external references to ourselves to have convalidated them explanations, the ontological status doesn’t even interest this order due to its inaccessibility. Just remember the phrase quoted above by Von Glasersfeld (1994). In this way, according to Maturana (1999), objectivity should be placed in parentheses, while appealing to reality as basis of the arguments has lost its epistemological validity, reserving only the status of a mere explanatory argument. In relation to education, if the only knowledge possible and viable is the one that forms part of the internal experience of each student, radically separate and different from the other (either reality or others), the figure of the teacher is completely minimized to the extreme. While this was proposed by other (for example, the piagetian) micro-focuses, in this case the proposal is taken to the extreme.

d) Formal or social constructivism, or social constructionism

The theoretical differentiation between constructivism and constructionism is extremely complex, since the second is sometimes considered as a specific form of Constructivism (radical, by the way), while at other times is directly understood as a different perspective to constructivism. For example, while on the one hand speaks of «formal constructivism» (Araya et al., 2007) or «social constructivism» (Barreto et al., 2006), on the other hand it refers directly to «social constructionism» (Hernandez Rojas, 2008).

Beyond the question mentioned previously, from the theoretical point of view, social constructionism assumes a much more focused position on social and political aspects (Munne, 1999) and its tenets, like the former micro-focus, they are radicals in reference to the building character of knowledge and its indifference to a so-called reality. His main contributions were initiated in Mead’s symbolic interactionism (1934 /1973) until you reach the work of Gergen (1985) and other current important researchers.

Constructionism is a Meta-theory (Canon, Pelaez & Noreña, 2005), it refers to a critical review of the general postulates on which modern thought is supported. Within this approach, the reality is regarded as an exclusively social construction. In this approach the concept of narrative (Hendez & Gonzalez, 2006) takes an essential role, because you set the vehicle through which the subject defines its relationship with society and, at the same time, his own reality.
From the foregoing, constructionism radically questioned the objectivity of any form of knowledge, both everyday and scientific, and within this frame of mind, has also maintained a clear concern for ethics and policy towards the so-called normalizing effects of psychology and education. In this sense, Ema Lopez (2009) says:

«Social constructionism discusses the relationships which are established between knowledge and reality in a context of questioning of some budgets for the scientific knowledge of the psychosocial phenomena (epistemology), the very nature of these phenomena (ontology) and the relationship between epistemology and ontology from its ethical-political implications (p. 228)».

Within this interpretative framework, the concept of educational subject resignifies itself in a different order, understanding it not from an individual level but in relation to a specific social context and through significant connections with other selves (Canon, 2008). But, unlike most of the constructivist approaches, the subject as ontological concept loses the character of substantiality, to re-invent itself as a dynamic configuration of meanings drawn from the social contexts that give it origin. This derives, on the other hand, the fact that both the individual and society should be mutually defined in function of the other, overcoming the dichotomy between the two raised traditionally (González, Cavieres, Diaz & Valdebenito, 2005).

According to the proposed analysis system social constructionism is differentiated from other approaches in the following:

1) Emphasis on social as an analysis unit. The main interest is in the study of interactive processes, mediated mainly through language and other signs given by the culture, which built and produce inseparable subjectivities of the context. The subject as an individual loses substantiality, to become a product of the social speeches of the ones who participate and undergo constant subjective reconfigurations.

2) Radical proposal (in the same way that radical constructivism posed previously based on the contributions of Von Glasersfeld, Von Foerster, Maturana, etc.).

Main themes addressed from constructivism in psychology and education

The diversity of items found in REDALYC linked with the area of psychology and education has been grouped around three basic categories: strategies for teaching and learning, didactics of the sciences, and incorporation of ICTs into the teaching-learning process.

1. Teaching and learning strategies

According to Barreto et al. (2005), there is a generally widespread agreement in relation to basic pedagogical principals of a constructivist approach in education. These are:

a) The knowledge is organized on the basis of previous cognitive structures, which are conformed in the extent that the subject learns, and at the same time, constitutes the support for the construction of new notions;

b) In the process of construction of knowledge the subject has an active role, as long as it produces different knowledge consistent with their own schemes.

c) The constant interplay of individual capabilities and the social factor. In this aspect, beyond the theoretical differences raised around this relationship, cannot be ignored the role of social interaction (in greater or lesser degree depending on perspective) in the construction of knowledge and cognitive development. In connection with this appearance, there also has been contribution from theorists of prospects based on the theory of situated cognition, in which emphasis is placed on the impossibility to dissociate the analysis of the processes of teaching and learning of the specific context in which they are developed (Baquero, 2002; Goldrine & Rojas, 2007). It has even been proposed to incorporate the contributions of other different disciplines to the psychology of education and instruction, like the linguistics, ethnography, social anthropology, etc., related to an ecological approach (Serrano & Pons, 2008).
In relation to curricular strategies based on constructivism, a set of common characteristics can be enumerated. Therefore, it was appealed to the proposal of Hatano (1993, cited by Baquero, 2002), to synthesize present elements shared in the different strategies:

1. Active position of the student.
2. The assumption that students are almost always looking for and often understand.
3. A building is genuine only if it is motivated by the search for meaning, or in the interest of expanding the understanding.
4. The construction of the students is facilitated by both horizontal and vertical interactions.
5. Access to a multiplicity of information sources favors the construction.
6. The existence of points of arrival not known in advance in construction processes (p. 59).

Theoretical and empirical articles referred to the pedagogical function of teachers and implementation of instructional strategies from a constructivist approach, in the specific context of education of a particular curricular content has been found inside the REDALYC base. The criteria for selection of the works consisted of taking those texts which analyzed, theoretically or from a specific application experience, constructivist strategies in different educational levels and/or according to the teaching of specific content. From this selection twelve works have been obtained, which have been analyzed according to the educational level studied (initial, primary, secondary, teacher training, University) and the corresponding curriculum area (math, science, language, etc.). At the same time, in relation to the empirical work, the interested also analyze what kind of designs were proposed for the analysis of experiences of implementation of constructivist strategies in education, promptly in function of the proposed design and the type of sample used. This last was carried out with the intention of globally know what kind of methodologies were applied to the study of such strategies. Table 3 summarizes the characteristics related to each selected item.

Regarding the first aspect (education level), studies covering all levels of the school system were found (initial, primary and secondary), and also at the University level, and teacher training. At the same time, in terms of the disciplinary addressed areas, although it was observed that they were analyzed different subjects or content, subtraction by studying the implementation of the constructivist strategies to many other specific curricular contents. It must take into account that the former conclusion, just like this article in general, is limited to the context of the REDALYC database. We would have to investigate other repositories of research to verify if the above applies to Latin America in general publications, or only those found within this review.

On the other hand, analyzed, empirical articles in which he realized experiences of application of some strategies based on constructivism in education showed that they were mostly addressed from qualitative methodologies. Specifically, the ethnographic method and action research method were the most predominant. This is consistent with a constructivist epistemological framework from which he departed this work (recall table 1, which compares the realist and constructivist approaches). At the same time, this is also linked with a clear preponderance of prototypical case analysis intentionally selected. In that sense, it keeps consistency with a clear preference for the pursuit of local knowledge and greater depth, the generation of generalized conclusions from the statistical point of view, from the quantitative approaches.
### Table 3
**Empirical and theoretical articles related to constructivist teaching and learning strategies**

<table>
<thead>
<tr>
<th>Authors</th>
<th>Educational level</th>
<th>Area and/or curriculum content</th>
<th>Approach and research design</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avila (2004)</td>
<td>First grade of basic education</td>
<td>Mathematics (acquisition of the notion of the number «1» and their representations)</td>
<td>Qualitative (analysis of five sessions)</td>
<td>A full course composed of one teacher and 30 students</td>
</tr>
<tr>
<td>Caldera and Escalante (2006)</td>
<td>Sixth grade of basic education</td>
<td>Teaching and learning of writing</td>
<td>Qualitative (ethnographic)</td>
<td>Two full courses. 'A' course, composed of teachers and 34 students; course &quot;B&quot;, consisting of 33 students and teachers</td>
</tr>
<tr>
<td>Caldera, Escalante y Teran (2010)</td>
<td>Teacher training</td>
<td>Teaching strategies of reading</td>
<td>Qualitative research (action-research)</td>
<td>30 teachers</td>
</tr>
<tr>
<td>Chamoso, Mitchell and Rawson (2004)</td>
<td>Initial level (children aged 3 to 5 years)</td>
<td>Math</td>
<td>Qualitative (analysis of five episodes)</td>
<td>Not highlighted</td>
</tr>
<tr>
<td>Delmastro (2005)</td>
<td>Intensive English (level IV)</td>
<td>English language teaching</td>
<td>Qualitative (ethnographic)</td>
<td>A course consisting of 23 students and teachers</td>
</tr>
<tr>
<td>Gomez (2005)</td>
<td>University</td>
<td>Dependent of each college career</td>
<td>Qualitative 16 courses of different university degrees (action-research)</td>
<td></td>
</tr>
<tr>
<td>Ramirez y Chacon (2007)</td>
<td>Ninth grade of basic education</td>
<td>Reading and understanding of the English language</td>
<td>Qualitative</td>
<td>34 students</td>
</tr>
<tr>
<td>Romero and Moncada (2007)</td>
<td>University</td>
<td>Environmental education</td>
<td>Qualitative - Quantitative</td>
<td>113 students</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Authors</th>
<th>Educational level</th>
<th>Area and/or curriculum content</th>
<th>Approach and research design</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Castro (2005)</td>
<td>-</td>
<td>Teaching of Artsplastic</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Corrales (2009)</td>
<td>-</td>
<td>Teaching of a second language</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fornells (2005)</td>
<td>-</td>
<td>Natural sciences</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Polanco (2004)</td>
<td>Initial level</td>
<td>The pedagogical questionas a strategy present in any subject</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
2. Didactics of the sciences

The teaching of science is another issue on which references have been found within this review. In recent times it has been manifested a great interest in this subject, mainly in relation to the crisis in science education, manifested in learning difficulties and lack of interest of students for concepts related to science (Benito, 2009). It is understood that this discouraging panorama is the result of a gap between the current traditional planning curriculum and the need to consider a number of educational changes, based on the following pedagogical reasons: a) epistemological reasons: by the evolution of the ideas about the nature of knowledge and its production. (b) social and cultural reasons: that make it necessary to conceive of another way the activity of teaching and learning as a result of their own social change that impacts on the social function of the teacher. (c) pedagogical and didactic reasons: the new way of conceiving the teaching and learning, from teaching by objectives to the discovery, meaningful learning or constructivism, have reflection, no doubt, in the own school practices (Benito, 2009, p. 29).

In relation to the teaching of science, Rodriguez and pine (2009) proposed the use of methodological activities as an alternative proposal to the traditional transmission of scientific knowledge, based on tasks of solving problems raised. These consisted of present students specific situations to be resolved, linked to their own content of science (characteristics of carbohydrates, proteins and lipids, digestion of the human body, properties of materials, structure of the atom, etc.). The above assumes a didactic approach as opposed to the exhibition transmission of the same notions, which also involves flexible planning, regulated by the interaction between the needs and demands of students and the teacher proposal. Similarly, Lopez, Flores and Gallegos (2000) have sustained this kind of principles related to the importance of rescuing the previous designs of students about concepts such as science, scientific knowledge, etc., to take a starting point on which to promote new levels of construction (Aparicio & Hoyos, 2008; Pecharroman, Pozo, Mateos & Perez, 2009).

Not only is it currently worked on educational strategies aimed at students, but also strategies focused on the training of trainers in science. According to Diaz (2002), this process should not only move towards the knowledge of specific techniques and methods, but it should also lead to a critical reflection on their own practice and production of didactic knowledge integrator. The development of these capabilities, fostered from a constructivist and critical-reflexive perspective, are based on a series of guiding ideas, such as the conception of the teacher as a reflective professional, the vindication of his work as an intellectual of teaching, as well as key mediator role between the student and knowledge.

3. The incorporation of ICT in the teaching-learning process

Social and cultural changes mentioned above are linked, to a large extent, with the advances of technology that occur increasingly faster. The field of psychology and education did not remain oblivious to this reality, causing different reflections on the relationship and incorporation of Information and Communication Technologies (ICT) for teaching and learning processes. According to Badilla and Chacon (2004), and Vicario (2009), who are based on the developments of Papert (1993, 1995), through technology-mediated learning the student holds a much more active role that in traditional didactics, since to rehearse, to fail, and correct the error (as in this case) generates the conditions of possibility to create and learn. In this sense, constructivism is the pedagogical framework upon which this type of experiences is held, since it advocates a role of self-management by the student, in which different alternatives of solution and construction of knowledge, under the guidance of the teacher.

According to Montes (2007), in relation to the use of technology in educational contexts, the incorporation of a constructivist approach allows a re-signification of these media in the teaching-learning processes. In this sense, it allows the passage of a perspective based on the «learn from technology» towards a new vision of the type «Learn
with technology». This distinction was proposed by Jonassen, Carr and Yueh (1998), to distinguish two concepts concerning the use of ICT in education. While the first conceived the student as a passive receiver of information conveyed by technological resources, the second gives the student an active role in the construction of knowledge, incorporating technology to the inside of that process.

On the other hand, the development of these technologies considerably favored the possibilities of communication, which allows to expand collaborative learning activities to virtual environments. In other words, from this renewal, it is not only possible to work in cooperation through interactions face to face (present) but resorting to computer-mediated activities. According to Hernandez Gallardo (2007), collaborative work in virtual environments presents a series of advantages in students, such as: greater role and self-management in the construction of their knowledge; promotion of studies and self-learning habits; enables new channels of communication; It supports interactive action among students; and other designated virtues.

In this review have been found different jobs which, supported on a constructivist perspective, were referred to the incorporation of ICT teaching strategies related to the teaching of different curriculum contents and different educational levels. To this end, we designed a last table (table 4) which was included in those jobs that gave an account of educational experiences related to ICTs, analyzing the level of education which was carried out, the area and/or content of the curriculum and the specific technological resource used.

In general, it was appreciated almost all the reported experiences, which analyzed the application of ICTs to education, they were carried out at the University or in the training of teachers. Probably this is linked with that it is much more feasible to work under this modality with University guys or teaching by a greater capacity for self-management, compared to children. Furthermore, we should look at other bases different to those used here (REDALYC), the existence of these features work in initial, primary and secondary education. In case the shortage of this type of research is confirmed, it could represent a field in which to propose new jobs linked to initial, primary and secondary education.

**By way of closing**

Since the mid-20th century, the epistemological foundations of social sciences have received a deep questioning, from the development of emerging disciplines and the consequent resignification of certain basic concepts

<table>
<thead>
<tr>
<th>Authors</th>
<th>Educational level</th>
<th>Area and/or curriculum content</th>
<th>Technological resource analyzed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gil (2004)</td>
<td>Training of professionals</td>
<td>Non-specific</td>
<td>Distance education programs</td>
</tr>
<tr>
<td>Hernández Gallardo (2007)</td>
<td>Non-specific</td>
<td>Non-specific</td>
<td>Course online, Forum, chat, e-mail, internet</td>
</tr>
<tr>
<td>McAnally, 2005</td>
<td>University man</td>
<td>Subject pedagogy</td>
<td>Moodle platform</td>
</tr>
<tr>
<td>Muñoz, Álvarez, Garza y Pinales, 2005</td>
<td>University man</td>
<td>Learning a model of work stages: analysis and design oriented to objects (ADOO)</td>
<td>Messaging, web site, editor of models, chat, discussion forum</td>
</tr>
<tr>
<td>Razende y Egg, 2006</td>
<td>Teacher training</td>
<td>Teacher training in physics</td>
<td>Forum</td>
</tr>
</tbody>
</table>
related to knowledge and science (Mahoney, 1998). This break allowed to redefine the relationship between the subject and object of knowledge, and within this context, constructivism emerged as a crystallized form of epistemological positioning. This perspective was assumed by many researchers in the social sciences in general, and of the field of psychology and education, in particular. According to Gonzalez Rey (2000), the Latin American psychology has not remained oblivious to these reformulations, basing their theoretical positions and lines of research in the constructivist assumptions, whether at that time as now.

In relation to the above, this paper proposed to investigate a very specific aspect of the issue, reviewing in the REDALYC database the Latin American publications in psychology and education from the last ten years approximately, linked to Constructivism as pedagogical, psychological and epistemological position. It is essential to clarify that, because of this, the conclusions obtained only must be confined to the specific context of search consisting of the analyzed data base. However, beyond this limitation, it is considered that it can mean a contribution, due to the vast amount of revised work and that REDALYC is a well known repository in Latin America and that it concentrated a large proportion of the publications of that territory.

While at work common nuclei have been marked as well as the internal differentiations in current constructivism, in implementing the different principles into daily teaching practice surely that which protrudes in the first place are those shared items. In other words, although internal theoretical discriminations are important (e.g., the debate between radical and moderate positions), in the concrete development of curricular planning it is rescued, above all the things, a general attitude, which opposes evidently not in the interior of constructivism, but against traditional didactic forms of expository cut. As proposed Neimeyer (1998, p. 19):

«What unites the constructivists is a commitment to a common epistemology, or theory of knowledge, (...). They believe that «reality» is ultimately noumenal, i.e., it is beyond the scope of our more ambitious theories, whether personal or scientific, denying us forever as humans security to justify our beliefs, faith, and ideologies by the simple appeal of «objective circumstances» outside ourselves. Instead, the Organization of hard achievement that we impose on the world of our experience is a precarious human construction, supported by our search, private and shared, of a bit of order and predictability in our lives, and our need to find some basis to our actions».

In short, from what worked, it can be concluded that the theoretical importance and practice of constructivism in the psychology of education is based on a basic attitude of respect towards the own and personal forms of each student in the construction of knowledge, and the role of the teacher as a tutor in that process. Of course, to thoroughly analyze some of these elements (for example, what is meant by building a knowledge or what is the teaching tutorial function) differences arise, but in general terms the psychological and pedagogical principles can homogenize.

Similarly, the importance of social interactions in the construction of knowledge is a unifying aspect of current constructivism. You can, in a theoretical end, intend that these relationships trigger purely individual de-centralizings (for example, the theory of the conflict hypothesis developed by the school of Geneva; Mugny & Doise, 1983; Perret-Clermont, 1984); or in the opposite arises that knowledge is an exclusively social process that occurs and holds in intersubjective spaces (for example, the social constructionism of Gergen, 1985). But, beyond this differentiation, the key role of social interaction in the construction of knowledge constitutes an unquestionable aspect.

On the other hand, while there have been different works which discussed strategies of teaching and learning based on a constructivist perspective, there are still many specific curricular contents to inquire at the levels of the education system. A key element that would facilitate these studies is given by the fact that the general principles have already been clearly delimited at the theoretical level; all it needs is to propose concrete ways to adapt them and contextualize them within the specific framework of teaching of different subjects and topics, both at school and at University and teacher training.
As mentioned above, this review sought not to exhaustively cover the diversity of Latin American productions in relation to the topic of interest, but simply limited itself to the repository REDALYC, for being considered as one of the major databases of Latin America. This will surely encourage complementary studies of this type, enabling to deepen and widen the panorama of the influence of constructivism in empirical and theoretical productions on psychology and education developed recently. In that situation, it may be more feasible to elaborate conclusions that include Latin American productions in general.

**Referencias**


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