

# TEACHING CONCEPTIONS OF TEACHING AND ASSESSMENT PRACTICES IN MATHEMATICS

**Richard Norman Gómez<sup>1</sup>**

UMECIT University, Panama

richardnorman@umecit.edu.pa

<https://orcid.org/0000-0002-0587-8029>

DOI: 10.37594/oratores.n16.693

Reception date: 24/03/2022

Revision date: 05/04/2022

Acceptance date: 24/04/2022

## ABSTRACT

Being the conceptions of a cognitive nature, they are not very evident and are oriented according to the criteria of the one who puts them into practice; therefore, *“if the conceptions that inform evaluation practices became evident, teachers could discover the heterogeneity of conceptions that are guiding their evaluation practices and instruments, which tend to be very diverse and, on occasions, opposed”* (Prieto and Contreras, 2008 p.7). Which reveals that conceptions are generally hidden by the very nature of people, which is why they have become so common that they go unnoticed. In this article, a bibliographic review is carried out to analyze the positions of different authors regarding the conceptions of teachers about teaching, evaluation and evaluative practices in mathematics, in order to understand the internal and external factors of the training process. It is concluded that the conceptions of teaching and the evaluative practices of teachers are the fundamental basis for directing the pedagogical processes in educational contexts, from the experiences of the actors involved.

**Keywords:** Conceptions, teaching, evaluative practices

---

<sup>1</sup> Bachelor's Degree in Mathematics and Physics, Universidad de Córdoba, Colombia, tutor of the “Todos a Aprender” Program of the Ministry of National Education. Professor at Universidad Cooperativa de Colombia. Professor at Remington University Corporation. Professor of the Santo Tomas University. Research and master's degree tutor, Universidad Metropolitana de Educación, Ciencia y Tecnología-UMECIT, Panama. Master in Education, University of Cordoba- SUE Caribe. Doctoral student in education Metropolitan University of Education, Science and Technology-UMECIT, Panama.

Doctoral student in educational sciences. This article is a product of the compendium and bibliographic compilation of the theoretical foundation of the research work entitled: “teachers’ conceptions for teaching and evaluative practices in elementary school mathematics in the public educational institutions of Montería” by the present author.

## **INTRODUCTION**

The conceptions of teaching and the evaluative practices of teachers in recent times, have been the subject of frequent research from the field of education at international, national and local levels; where projects, programs and public policies have been generated in all areas, with a view to improving the quality of the educational service provided in the different countries of the world.

For some authors, conceptions, are defined as an organized system of beliefs, originated in the experiences of the individual and developed through the interactions in which he/she participates (Hasselgren & Beach, 1997; Marton, 1981; Säljö, 1994; Martín, Mateos, Martínez, Cervi, Pecharroman & Villalon, 2006; Coll & Remesal, 2009; Remesal, 2011; Hidalgo & Murillo, 2017). In other words, conceptions are ideas and imaginaries of each person, which are structured over time as a result of the accumulation of experiences and relationships within the context.

Likewise, in the educational field, teachers' conceptions are considered as a network of beliefs, ideas and opinions that directly influence the way in which they understand the teaching-learning process and interact daily with their students and other colleagues (Thompson, 1992; Griffiths, Gore & Ladwig, 2006; Prieto & Contreras, 2008; Hidalgo & Murillo, 2017).

This indicates that teachers' conceptions are a structured fabric of opinions and imaginaries, related to the way of conceiving the educational process, based on the interactions among the members of the educational community.

In this sense, life experiences, the context in which they work, their previous experiences within the educational system, social and political pressures, are considered to shape these implicit ideas of teachers, integrating them into their cognitive structures and directly influencing their way of understanding teaching, learning or evaluation (Prieto & Contreras, 2008; Hidalgo & Murillo, 2017). That is, from daily life, interactions with the educational system, social and political dynamics, somehow shape the way of being, thinking and acting of the teacher, thus translating into the understanding of pedagogical processes.

## **CONCEPTIONS OF TEACHING**

Defining the term teaching is not simple, given the intrinsic relationship it has with the term learning, in addition to the different approaches or theories of the moment. Gvirtz & Palamidessi (1998, p.135) cited by (Mendez, 2014), present a first definition, which is conceived as an

“activity that seeks to favor learning. Teaching generates a scaffolding to facilitate the learning of something that the learner can do if he/she is given help...” (p.1). It is observed that teaching requires organization, planning, resources and someone who can execute it, that someone must have pedagogical, didactic and technological competencies, in addition to being suitable to ensure that those who receive the teaching produce effective learning.

As for the theoretical approaches to teaching, Patterson (1992), states that it was not yet possible to speak of a fully established theory of teaching, since the existing knowledge about it are rather approaches (p.2).

In this sense, as far as teaching is concerned, Piaget states that it is produced from the inside to the outside and the duty of education is to seek ways to support the natural growth that will provide the intellectual, affective and social development of the child. This can be interpreted in the words of (Méndez, 2014) as that which “*must be structured in a way that favors the staff’s constructive processes, through which growth takes place. Discovery activities should therefore be a priority*”. Now, from the theoretical position of Bruner & Patterson (1982) cited by (Mendes, 2010, p.2), he emphasizes that,

people are subjects who construct their world and therefore are not configured by the environment. Thus, the individual is not passive, but participates through his reasoning, the formulation of concepts and creation in the construction of his knowledge.

The same author, when referring to Bruner, always according to Patterson (1982), is the first to attempt to propose a theory of instruction and some of the criteria he uses in his theory are: 1) to say how human beings can be assisted in learning to develop. 2) to punctuate the criteria to achieve the creation of a teaching environment that leads to the best possible learning and 3) his theory of instruction is prescriptive, since it specifies the elements or situations that must be carried out to impart teaching (Méndez, 2014, p. 4).

The third main approach is Skinner’s behaviorism. In this regard says Patterson (1982) cited by (Mendes, 2010, p. 3), that Skinner considers that:

every living being is in activity, which means that it is in contact with the environment where it is and that at the same time there is an interaction between the organism and the environment. In addition, he maintains that in this interaction there are 3 moments: the moment when a response occurs, the response and the reinforcing consequences.

Regarding education, Skinner considers that since the Being has a natural development and possesses innate characteristics and potentialities, education should encourage natural development and direct growth. Education, then, models the student's behavior.

Indeed, these three theoretical positions make it possible to elucidate how teaching is of a complex nature, it is not enough for teachers to possess erudite knowledge, but to understand those theoretical elements that can provide the basis for learning how teaching works, its dynamics, advantages and disadvantages, internal and external aspects. But above all, to reflect in order to move forward, hence it can be said that whoever teaches learns from what he/she teaches.

Along the same lines, Medina & Salvador (2002), in their book *General Didactics*, propose four teaching theories: the cognitivist theory, the artistic theory, the compressive theory and the socio-communicative theory. As for the cognitivist theory, it has to do with the subject's abilities and the ways in which he or she reworks it. Stimuli external to teaching are not important, but the personality of the teacher, that is, of the teacher as the protagonist of the teaching action, is decisive.

Some theorists associated with this theory are Ausubel and Bruner.

As for the artistic theory, it refers to teaching as a creative activity, where the teacher creates challenging and novel learning situations, which he teaches considering the principle of originality. The third theory is the so-called comprehensive theory. In this theory, the teacher's reflective evaluation of each student, the classroom and its educational micro community is important. In the words of Medina & Salvador (2002, p.48) "*comprehension seeks to understand the complex behaviors of human beings in the most diverse scenarios, the attitudes and perceptions of people*". Although this comprehensive theory was proposed and is worked on in the so-called Project Zero of Harvard University (Perkins, 1999) cited in Medina & Salvador (2002, p.49), it mentions the pillars of the comprehensive theory, namely: Selecting teaching topics in common agreement between teacher and student; formulating and explicitly agreeing on the objectives that will engage the teacher and the student; choosing the most appropriate representations for the understanding of the topics to be studied; and carrying out a formative evaluation.

Finally, the socio-communicative theory sees teaching as a communicative activity, given in a context and coherent with the formative purposes. Thus, teaching "*is understood as an activity that generates interactions, promotes socio-affective intelligence, singular attitudes, collaboration*

*and tolerant community and shared effort*” (Medina and Salvador, 2002, p.53). An analysis of these theories regarding the contributions to this research focuses on the fact of seeing the teacher as the central element of teaching, without neglecting the importance of the relationships that can be established between teachers, students, and the context, as well as conceiving teaching from the formative purposes.

### **CONCEPTIONS OF MATHEMATICS TEACHING**

A first approach to the foundations on the conceptions of mathematics teaching is made by Godino, Batanero, & Font (2003), they assume:

mathematics as a human endeavor (mathematics is a human activity), symbolic language (the language of science) and conceptual system (interconnected network of concepts, properties and relations, progressively constructed through social negotiation). The way mathematics is conceived by the teacher will influence the way it is taught. In addition, the teacher considers the functions and tasks that he/she believes to be most effective in promoting student learning and favorable attitudes towards mathematics. Some of these tasks are to be performed by the teacher and others by the students (p.61).

Indeed, they put into play in the pedagogical practice their conceptions of mathematics, where many of them possibly do it carried by the experience of long years as a result of how they learned it from their teacher educators. But it is observed that every day many of them try to improve in the teaching of mathematics, but they do not do it from a pedagogical foundation that allows them to do it in a reflexive, critical, investigative and coherent way with the new approaches to the teaching of mathematics.

In this order of ideas, Godino et al. (2003, p.19), when reflecting on their own conceptions of mathematics, agree that throughout time there have been diverse opinions and beliefs about the nature of mathematics, mathematical activity and the ability to learn mathematics. In Colombia, a study on the conceptions and nature of mathematics, mathematical activity, and mathematical activity, carried out with practicing teachers and master’s degree students in mathematics (Ministry of National Education, 1998, p. 9), found that, with respect to the nature of mathematics, some teachers assume it as a static and unified body of knowledge, others conceive it as a set of interconnected structures, others simply as a set of rules, facts, and tools; others describe it as the science of numbers and demonstrations.

As can be seen, these four ways of perceiving the conception of the nature of mathematics reflect in the classroom practice, the decision making and actions that as teachers allow them to act from school mathematics. This means that, according to the conception of the nature of mathematics that the teacher assumes, the way he/she teaches mathematics will also be directed. This aspect constitutes an element or starting point that can be analyzed in the teachers who develop mathematics in the educational institutions, in order to establish didactic actions that promote an improvement in the epistemic pertinence and the way in which the area should be taught at present.

Regarding mathematical work, the study found that some teachers associate it with the activity of solving problems, others with the ordering of established mathematical knowledge, and others with the construction of new knowledge based on what is already known, following logical rules. It is clear that this aspect relates to the practical side of mathematics, its field of use and application. If only these types of conceptions prevail in the teachers' ideology of doing mathematics, an immediate consequence is that the mathematical practice would not respond to the relevance, to the historical and cultural needs of today's society, where classroom practice and mathematical practice, its contextualization, its dynamics and applications are in a world order permeated by technological and scientific advances that need to respond to new social and cultural demands, among others.

The literature reviewed shows some philosophical postures that have underpinned the teaching of mathematics since ancient times. Godino et al (2003), highlights the idealist-platonist conception, characterized by the great variety of beliefs about the relationship between mathematics and its applications and about the role of mathematics in teaching and learning. One of these conceptions, which was common among many professional mathematicians until a few years ago, considers that the student must first acquire the fundamental structures of mathematics axiomatically. It is assumed that once this foundation has been acquired, it will be easy for the student on his own to solve the applications and problems that are presented to him. According to this view, one cannot be able to apply mathematics, except in very trivial cases, if one does not have a good mathematical foundation. People who hold this belief think that mathematics is an autonomous discipline. That is, mathematics could be developed without taking into account its applications to other sciences, only on the basis of problems internal to mathematics. This conception of mathematics is called "*idealistic-platonic*".

The constructivist conception, in this case, mathematicians and mathematics teachers believe

that there should be a close relationship between mathematics and its applications throughout the curriculum. They think it is important to show students the need for each part of mathematics before it is introduced to them. Students should be able to see how each part of mathematics meets a certain need. In this view, applications, both external and internal, should precede and follow the creation of mathematics; mathematics should appear as a natural and spontaneous response of the human mind and genius to problems that arise in the physical, biological, and social environment in which man lives. Students must see, for themselves, that the axiomatization, generalization, and abstraction of mathematics are necessary in order to understand the problems of nature and society. Proponents of this view would like to be able to start with some problems of nature and society, to build the fundamental structures of mathematics from them. In this way, students would be introduced to the close relationship between mathematics and its applications (p.20-21).

Nevertheless, along the same lines, the results of other research and experiences have shown how to help students on specific points, which should guide the teacher's judgment and professional activity. Godino et al (2003) argue that to be effective:

teachers must know and understand in depth the mathematics they are teaching and be able to draw on that knowledge flexibly in their tasks; understand and engage with their students as learners; be skilled in choosing and using a variety of pedagogical and assessment strategies. In addition, a reflective attitude and continuous efforts to seek improvement (p. 68).

Indeed, it is necessary that teachers who develop mathematics teaching know it, make the tasks more flexible, improve the strategies, in other words, make them a dynamic process that takes into account the needs of the students, the context, the social dynamics and the culture.

Currently, in many countries, including Colombia, the competency-based approach has been adopted in the teaching of mathematics. In this regard, Godino et al (2003), referring to this approach, argue that *"if we want students to acquire competence and understanding of the different components of mathematical content, we must take these components into account when planning and carrying out the teaching"* (p.71). This is considered the focus for the research inspection, given that sometimes it is worth asking how much conceptual clarity do teachers of the different educational levels in the educational institutions have about the curricular structure of mathematics? How do they practice the evaluation of learning? From what epistemological position do teachers concretize the teaching and evaluative practice of mathematical learning? What do they understand

by approach and by competencies?

In order to answer these questions, the didactics of mathematics and its role in teaching becomes relevant. Hence, the Frenchman Brousseau (1988) cited by (Godino, Batanero, & Font, 2003), who proposed the theory of didactic situations, which is understood as “a situation intentionally constructed with the purpose of acquiring from the students a determined knowledge”. There are several types of didactic situations to carry out this process, among which there are:

- Action didactic situations, where the student explores and tries to solve problems; where the student will construct or acquire new mathematical knowledge; action situations must be based on genuine problems that attract the students’ interest; offering the opportunity to investigate possible solutions by themselves, individually or in small groups.
- Didactic situations of Formulation/communication, in this type is when the student puts in writing his solutions and communicates them to other children or to the teacher; exercising the mathematical language.
- Didactic situations of Validation, in these the student must prove that their solutions are correct and develop their capacity for argumentation.
- Institutionalization didactic situations, where what has been learned is put in common, definitions and ways of expressing the mathematical properties studied are fixed and shared.

These aspects of conceiving teaching by competence imply other elements that are fundamental at the moment of developing the teaching of mathematics, it is clear that the center of the process is no longer in the teacher but in the student’s learning, hence, thinking and designing creative and challenging didactic situations for the students’ learning is a challenge that each teacher must assume, taking into account that many times he/she must construct and deconstruct his/her own learning in order to achieve significant learning in the students.

This perspective of designing didactic situations, gave the student the possibility of constructing knowledge as well as the need to give a central role - within the organization of teaching - to the existence of learning moments, conceived as moments in which the student is alone in front of the resolution of a problem, without the teacher intervening in issues related to the knowledge at stake. Now, the recognition of the need for these learning moments gave rise to the notion of a-didactic situation (or a-didactic phase within a didactic situation), which was defined by (Brousseau, 1986) as:

any situation which, on the one hand, cannot be mastered in a convenient way without the putting into practice of the knowledge or the intended knowledge and which, on the other hand, sanctions the choices made by the learner (good or bad) without the intervention of the teacher concerning the knowledge that is put into play.

This aspect is relevant because we could inquire about the didactic actions or activities proposed by teachers in the teaching of mathematics in educational institutions.

### **TEACHING CONCEPTIONS ON ASSESSMENT.**

In relation to this theoretical construct, (Coll & Remesal, 2009; Hasselgren & Beach, 2006; Martin, Mateos, Martinez, Cervi, & Percharroman, 2006; Marton, 1981; Remesal, 2011; Säljö, 1997) cited by (Hidalgo & Murillo 2017, p. 108), state that “conceptions are defined as an organized system of beliefs, originated in the experiences of the individual and developed through the interactions in which he/she participates”. In this sense, this definition points out that conceptions are constructed and developed individually by the subjects and are also supported by the interactions they sustain.

In turn, Thompson (1992) affirms, “*a different and specific meaning is necessary for conceptions, understanding it as a more general mental structure that encompasses beliefs, meanings, concepts, propositions, rules, mental images, preferences, etc. that configure the way in which people face different phenomena*” (p. 130). Although this concept is broader in the sense that it seeks to establish differences between conceptions and other similar concepts, basically all of them allow the individual to organize mentally to face the phenomena to which he/she is confronted, where he/she must make decisions that affect him/her. It is important to emphasize that our conceptions are built in the interaction with other people, so that the way we conceive the world is directly influenced by the individuals around us” (Pozo, 2006; Van den Berg, 2002). As can be seen, a key aspect of conceptions is that they are of a social nature, i.e., although they are constructed individually within themselves, they are the product of interaction with others.

Now, from the point of view of teachers, research has shown that there are different aspects from the evaluation that are touched upon in relation to conceptions. In this regard Vergara (2011), argue that,

teachers are the agents responsible for validating the diverse achievements of students and guiding the evaluation process for their learning, highlighting its formative nature,

which promotes knowledge and understanding of the different styles, forms and rhythms of learning (p.7).

In this order of ideas, a teacher has to be much more than a validator of knowledge of his students, it implies being clear about the very nature of evaluation, its purposes, functions, types, but above all being aware of the role it plays in the formation of others. And that, in this regard Griffiths, Gore, & Ladwig, (2006); Prieto & Contreras, (2008); Thompson, (1992), define it as, teachers' conceptions are a network of beliefs, ideas and opinions that directly influence the way in which they understand the teaching-learning process and interact daily with their students and other fellow teachers.

Similarly, Philipp (2007); Pratt (1992); Thompson (1992), conceive teaching conceptions as "*a framework or structure of implicit staff ideas through which teachers interpret their professional practice*". This definition is relevant in that it would contribute to understanding teachers' conceptions of teaching and evaluative practices in mathematics.

Complementing the above, the findings of different research confirm that there are four main types of conceptions that teachers have about the assessment of student learning (Brown, 2003, 2004; Harris & Brown, 2008, 2009; Brown & Hirschfeld, 2008):

- Assessment as improvement, understood as an activity that provides useful information to transform teaching practice as well as student learning.
- Evaluation as a tool for school accountability, understood as an instrument for teachers to demonstrate that their work is being done correctly and that it is helping students to reach the educational standards of quality.
- Evaluation as an instrument of accountability of the students themselves, considered as the moment in which students demonstrate their learning and the degree of achievement of the objectives set.
- Evaluation as an irrelevant process, conceiving evaluation as a process of little use for learning, since it only serves to grade and classify students, which affects their self-concept and does not help their learning.

## **TEACHING CONCEPTIONS ON MATHEMATIC EVALUATION**

Regarding this central element, a first approach is made by (Moreno & Ortiz, 2008, p.141), when addressing the issue of teachers' conceptions and mathematical assessment, showing the

existence of four dimensions around the curriculum that are related to each other, the authors state that “every curriculum admits different levels of reflection and at the level that is more linked to the teacher’s practice, it takes shape in four dimensions: objectives, contents, methodology and assessment”, focusing their analysis on the last dimension, i.e., mathematical assessment. According to Webb (1992), assessment in mathematics involves learning, teaching, teaching action, curriculum and institutional aspects, among others.

Moreno & Rochera (2015), referring to the socio-constructivist approach to teaching and learning, proposed by the studies of Coll & Remesal (2009), Remesal (2011) on the conceptions of assessment in primary education and secondary education, highlight that these, inform us of the existence of a continuum of conceptions that move from a pedagogical pole to a social pole. The pedagogical pole links assessment to the regulation of teaching and learning processes, and the social-accreditation pole links assessment to certification and accountability established by the educational system and society (p.127).

Likewise, Remesal (2011), based on the Brown (2003) studies, related to the conceptions of evaluation, makes an approximation of these through four dimensions of analysis: a) conceptions about the role of evaluation in learning, b) conceptions about the role of evaluation in teaching, c) conceptions about the role of evaluation in the certification or accreditation of student learning and (d) conceptions about the role of evaluation in accountability to diverse audiences (Moreno & Rochera, 2015, p.128). The results of these studies speak of the presence of mixed conceptions that possess characteristics of the pedagogical pole and the social pole, but with prevalence in one of them.

In the case of pedagogical mixed conceptions, they are more recurrent in the dimensions concerning teaching rather than learning. In the case of social mixed conceptions, on the other hand, beliefs with a predominance of the social pole are more frequent in the dimensions related to learning and accreditation of results than in the dimensions related to teaching and accountability. Finally, the results point to the existence of undefined mixed conceptions made up of beliefs without a clear primacy of one or the other pole in the four dimensions.

In addition, the studies by Coll & Remesal (2009) cited by (Moreno & Rochera, 2015), found certain trends in the distribution of these conceptions in the teaching staff depending on whether it

is primary education or secondary education. The authors state that:

There is a greater tendency for teachers to have conceptions inclined to the social pole at the levels of Compulsory Higher Education (ESO), understanding evaluation as an instrument of certification or accreditation of student learning. The situation is different at the Primary Education (PE) levels, where there is a predominance of the conceptions that prevail in the pedagogical pole, due to the lesser importance given to certification compared to the ESO levels.

As can be seen from these epistemic positions, conceptions play a fundamental role in the evaluative practice of mathematics teachers; they have the power to improve student learning, as well as teachers' teaching. They should guide teachers' actions, so that mathematics teaching can have a more attractive and meaningful meaning in the learning process.

#### **TEACHING CONCEPTIONS OF EVALUATIVE PRACTICES.**

This central category is addressed by recognized authors who have been developing studies on this subject for some time. In this regard (Santos, 2003, p.69), when referring to evaluative practice, maintains that “the way in which the evaluative act is carried out reveals not only technical notions related to evaluation, but also psychological, political, social and moral meanings of the professional”, which means that there are internal and external elements that must be taken into account when reflecting on the evaluative practice developed by teachers. In addition to the above, the same author states that *“the way of understanding and practicing evaluation allows us to deduce the theories on which it is based”*.

This epistemic element proposed by Santos (2003), allows this researcher to investigate in this context how elementary school teachers are theorizing the teaching and evaluative practice of mathematics that they take to the classroom, since at this time when a competency-based teaching is being developed, it is good to know how the theory about teaching-learning by competencies permeates the doing, the know-how and the knowledge of teachers regarding their evaluative practice of mathematics.

Santos (Santos, 2003, p.78) argues that “it is necessary to question the evaluation practices”, explaining that *“if the practice is not subjected to a rigorous analysis that questions the framework of principles, requirements and standards, it will be difficult to understand and transform it”*. Furthermore, *“evaluation has been limited to student learning, but, logically, teaching must also be*

*evaluated (Jimenez, 1999). If teaching is evaluated, it will be easier to improve learning processes”.*

In turn, Prieto & Contreras (2008), referring to the topic in question, state that “teachers’ evaluative practices cannot be considered impartial, not only because they are a reflection of their professional knowledge and beliefs, but also because they influence learning and produce critical effects on students” (p.8). In this sense, it is possible to understand the importance of the teacher in the evaluation process, the subjectivities and the professional technical aspects that make the practice a complex aspect that must be analyzed to understand at the present time how teachers conceive the evaluative practice from the area of mathematics in the corresponding educational levels.

## **METHODOLOGY**

Attending to some central categories related to teachers’ conceptions for teaching and evaluative practices in mathematics, the thematic areas such as conceptions of teaching, conceptions of mathematics teaching, teachers’ conceptions about evaluation were approached, teaching conceptions on mathematical evaluation and teaching conceptions on evaluative practices from diverse bibliographic reviews from primary, secondary and tertiary sources obtained from repositories, specialized journals, databases in the field of education that allowed structuring the conceptual bases that were used as epistemological foundations of the present article.

## **CONCLUSIONS**

The conceptions of teaching and the evaluative practices of teachers are fundamental aspects to direct the processes of pedagogical practices inside and outside the classroom, since they are based on the thoughts and beliefs of teachers, according to the experiences lived, shared, over time and according to the educational contexts where educational practices are carried out.

Teaching is a complex activity for the understanding of the functioning of the surrounding world, which contributes to the process of adaptation of the individual to the context, through systematic learning, planned and with theoretical, pedagogical, didactic and technological resources available to the teaching staff, and that this makes possible within the training process in the assimilation of the functioning of the environment by the students.

Human beings are not perfect, but they can be perfected, and in that way, it is fundamental to obtain basic notions of the fundamental structures of mathematics in an axiomatic way, and at the

same time to acquire abilities and skills that make it possible to project diverse ways to apply in a natural, spontaneous way this mathematical knowledge in the resolution of multiple problems in other sciences and in the context.

The way of carrying out the evaluative practices shows how the evaluative act is executed and at the same time allows elucidating psychological, political, social and moral aspects of the professional who performs the practice, which implies that the evaluative process, besides being complex by nature, has internal and external factors to reflect and analyze within the formative and pedagogical process.

### **BIBLIOGRAPHIC REFERENCES.**

- Brousseau, (1986). Fundamentos y Métodos de la Didáctica de las matemáticas. *Recherches en Didactique des Mathématiques*. Vol. 7, N°. 2., 33-115.
- Brown, G. T. L. (2003). Teachers' conceptions of assessment. Tesis Doctoral. Universidad de Auckland, Nueva Zelanda.
- Brown, G. T. L. (2004). Teachers' conceptions of assessment: Implications for policy and professional development. *Assessment in Education: Principles, Policy & Practice*, 11(3), 301- 318. doi: 10.1080/0969594042000304609.
- Brown, G. T. L. y Hirschfeld, G. H. (2008). Students' conceptions of assessment: Links to outcomes. *Assessment in Education: Principles, Policy & Practice*, 15(1), 3-17. Doi: 10.1080/09695940701876003
- Coll, C., & Remesal, A. (2009). Concepciones del profesorado de matemáticas acerca de las funciones de la evaluación del aprendizaje en la educación obligatoria. *Journal for the Study of Education and Development, Infancia y Aprendizaje*. Vol. 32, N° 3., 391 - 404.
- Godino, J., Batanero, C., & Font, V. (2003). Fundamento para la Enseñanza y el Aprendizaje de las matemáticas para maestros. Peru: Universida Nueva Granada.
- Griffiths, T., Gore, J., y Ladwig, J. (noviembre, 2006). Teachers' fundamental beliefs, commitment to reform, and the quality of pedagogy. Comunicación presentada en la Conferencia anual Proceedings Australian Association for Research in Education. Universidad de Adelaide, Australia.
- Gvirtz, S., & Palamidessi, M. (1998). El ABC de la tarea docente: currículo y Enseñanza. Buenos Aires: Aique.
- Hasselgren, B., & Beach, D. (2006). Fenomenografía, un hermano bueno para nada de la Fenomenología? Esquema de un análisis. *Higher Education Research & Development*, Vol.16, N°2., 191 - 202.
- Hasselgren, B., & Beach, D. (2006). Fenomenografía, un hermano bueno para nada de la Fenomenología? Esquema de un análisis. *Higher Education Research & Development*, Vol.16, N°2., 191 - 202.
- Hidalgo, N. & Murillo, F. (2017). Las Concepciones sobre el Proceso de Evaluación del Aprendizaje de los Estudiantes. *Revista Iberoamericana sobre Calidad, Eficacia y Cambio en Educación*, 15(1), 107-128. doi:10.15366/reice2017.15.1.007.
- Jimenez, B. (1999). Evaluación de programas, centros y profesores. España: Síntesis.
- Martín, E., Mateos, M., Martínez, P., Cervi, J., Pecharromán, A., & Villalón, R. (2006) Las concepciones de los profesores de educación primaria sobre la enseñanza y el aprendizaje.

En J. I. Pozo, N. Scheuer, M. Pérez, M. Mateos y M. de la Cruz. Nuevas formas de pensar la enseñanza y el aprendizaje, las concepciones de profesores y alumnos, pp. 170-187. Barcelona: Graó,

- Marton, F. (1981). Fenomenografía: descripción de concepciones del mundo que nos rodea. Ciencia instruccional. Vol.10., 177 - 200.
- Medina, A., & Salvador, F. (2002). Didáctica General. España: Prentice Hall.
- Méndez, N. (11 de 06 de 2014). ¿Qué es la enseñanza? Obtenido de <https://www.academia.edu>: [https://www.academia.edu/5399459/\\_Qu%C3%A9\\_es\\_la\\_ense%C3%B1anza](https://www.academia.edu/5399459/_Qu%C3%A9_es_la_ense%C3%B1anza)
- Ministerio de Educación Nacional. (1998). Serie Lineamientos Curriculares de Matemática. Bogotá: MEN.
- Moreno, I., & Ortiz, J. (2008). Docentes de Educación Básica y sus Concepciones acerca de la Evaluación Matemática. Revista Iberoamericana de Evaluación Educativa. Vol. 1, N°1, 140 - 153.
- Moreno, L., & Rochera, M. J. (2015). Congruencias y Discrepancias entre Concepciones y Prácticas Evaluativas con uso de TIC. Perspectiva Educativa. Formación de Profesores. Vol. 54, N° 2, 126 - 146.
- Patterson, C. (1982). Bases para una teoría de la enseñanza y psicología de la educación. Mexico: Universidad Autónoma de Nuevo León Mexico.
- Perkins, D. (1999). Enseñanza para la comprensión. Buenos Aires: Paidós.
- Philipp, R. (2007). Creencias y afecto de los profesores de matemáticas. (Ed.), Second Handbook of Research on Mathematics Teaching and Learning. . Charlotte.: National Council of Teachers of Mathematics.
- Pozo, J. (2006). La cultura del aprendizaje en la sociedad del conocimiento. En J. Pozo, N. Scheuer, M. P. Pérez Echevarría, M. Mateos, E. Martín y M. De la Cruz (Eds.), Nuevas formas de pensar la enseñanza y el aprendizaje. Las concepciones de profesores y alumnos (pp. 29-53). Barcelona: Graó.
- Pratt, D. (1992). Concepciones de la enseñanza. Revistas SAGE. Vol. 42. N° 4, 203 -220.
- Prieto, M., & Contreras, M. (2008). Las concepciones que orientan las prácticas evaluativas de los profesores: Un problema a develar. (E. p. (Valdivia), Ed.) Scielo, 2(ISSN 0718-0705), 245 - 262.
- Ramesal, A. (2011). Concepciones de evaluación de los profesores de primaria y secundaria. Un estudio cualitativo. Docencia y formación del profesorado. Vol. 22. N° 2, 472 - 482.
- Säljö, R. (1997). Hablar como datos y práctica: una mirada crítica a la investigación

- fenomenográfica y la apelación a la experiencia. Investigación y desarrollo de educación superior. Vol. 16 N° 2, 173 - 190.
- Santos, M. (2003). Dime cómo evalúas y te diré qué tipo de profesional y de persona eres. Enfoques Educativos 5., 69 -80.
  - Thompson, A. (1992). Creencias y concepciones de los profesores: síntesis de la investigación. En DA Grouws (Ed.), Manual de investigación sobre la enseñanza y el aprendizaje de las matemáticas. un proyecto del Consejo Nacional de Profesores de Matemáticas. (p. 127-146). Washington: Macmillan Publishing Co, Inc.
  - Thompson, A. G. (1992). Teachers' beliefs and conceptions: A synthesis of the research. Nueva York, NY: Macmillan Publishing.
  - Van den Berg, R. (2002). Significados de los profesores sobre la práctica educativa. SAGE. Vol. 72 , N° 4, , 577-625.
  - Vergara, C. E. (2011). Concepciones de Evaluación del Aprendizaje de Docentes Chilenos Destacados de Educación Básica. Acción Pedagógica, N° 20. , 06 - 18.
  - Webb, N. (1992). Assessment of Students Knowledge of Mathematics. Steps Toward a Theory. En D. Grouws (Ed.) Handbook of Research on Mathematics Teaching and Learning. New York: Macmillan.