REVIEW ARTICLE

Communities of Practice as Platforms for Educational Improvement

Comunidades de práctica como plataformas de mejoramiento educativo

Comunidades de prática como plataformas para melhoria educacional

MILTON CÉSAR FLÓREZ CARDOSO* iD   OLGA LUCIA FERNÁNDEZ ARBELÁEZ** iD

* PhD Candidate in Education. Master's Degree in Natural Sciences Teaching. Degree in Mathematics and Physics. Teacher at the Institución Educativa Promoción Social in Palermo (Huila).http://orcid.org/0000-0003-4721-7277
** PhD in Education. Postdoctoral internship Comparative methodology in research. University Professor, Universidad Católica de Manizales. Researcher ALFA Research Group, Education and Democracy Line, Universidad Católica de Manizales. Manizales, Caldas, Colombia. http://orcid.org/0000-0001-8110-6381

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ABSTRACT

This article reports a literature review on communities of practice developed in the educational context. Its purpose is to serve as a documentary basis for the visualization of a preliminary panorama in the subsequent development of a research on the effects of the configuration of a community of practice in the teaching of mathematics when it is formed by elementary school teachers from the same educational institution. Therefore, the main findings of research related to three levels of Colombian education are presented, namely: university and basic secondary and middle school education, where a greater amount of research is evidenced when compared to basic elementary education. One of the main conclusions is that communities of practice play a fundamental role when they are used to improve educational processes, allowing the strengthening of mechanisms for the improvement of pedagogical practices.

Author correspondence:

milton.florez@ucm.edu.co
ofernandez@ucm.edu.co

RESUMO

Este artigo relata uma revisão bibliográfica sobre comunidades de prática cultivadas no contexto educacional. Tem por finalidade servir de base documental, para a visualização de um panorama preliminar, no posterior desenvolvimento de uma investigação sobre os efeitos que a configuração de uma comunidade de prática tem no ensino da matemática, quando este é constituído por professores de educação, escola primária da mesma instituição de ensino. Portanto, são apresentados os principais resultados das pesquisas relacionadas aos três níveis da educação colombiana, a saber: a universidade e a educação básica secundária e média, onde se evidencia uma maior quantidade de pesquisas quando comparada à educação primária básica. Uma das principais conclusões é que as comunidades de prática desempenham um papel fundamental, quando são utilizadas para a melhoria dos processos educativos, permitindo fortalecer os mecanismos de melhoria das práticas pedagógicas.

Introduction

Communities of practice (CoP) are a type of organizational structure that seem to have emerged in the business sector. However, one of its main representatives currently mentions that: Although the term may be new, its experience is not (Wenger, 2001, p. 24), because all human beings belong one way or another to different communities of practice. Examples are those formed by members of a household or those that sprout between co-workers in a factory, since within them rituals are established, ways of being and acting that correspond to certain guidelines. Also, there is a specific number of members that may vary, for example, by the birth of a new member in the family, or by the dismissal or hiring of an operator. They have shared challenges such as What to do to make ends meet? or How to meet a productivity goal? In both cases each member of the collectivity is involved to the extent of his responsibility or under an agreement (in some cases, tacit and in others, previously established by a contract).

An example of a CoP usually results when its affiliation is not family or work-related, but educational. When its members belong to a school or are linked to some training context, whether they are teachers, as if they are students, or if they are part of the staff of teaching directors. They are all immersed in a set of rules or regulations designed (generally) on quality principles that characterize what happens inside them and that most likely have as their main objective to develop effective learning in their students. In his book *Comunidades de práctica: aprendizaje, significado e identidad*, Wenger (2001) proposes to rethink learning from the perspective of participation, whether as an individual, as a community or as an organization, since he always assumes that learning is an integral part of everyday life.

Although CoPs are found in countless contexts and favorably serve all types of organizations, for the purpose of this article a literature review of research related to communities of practice in the field of mathematics education is shown. From there, it was possible to visualize the characteristics of its implementation at three levels: university, secondary and middle school, and elementary school, and for which a theoretical framework was established as a first step to support the documentary review.

Characterizing Communities of Practice

According to Wenger, McDermott & Snyder (2002), Communities of Practice (CoP) are made up of people who share a concern, a set of problems, or a passion for a topic, who deepen their knowledge and experience in this area by interconnecting on an ongoing basis (p. 5). Today, through their study and review, three elements that constitute them can be distinguished (see Figure 1), namely: a mutual commitment, a joint venture and a shared repertoire.

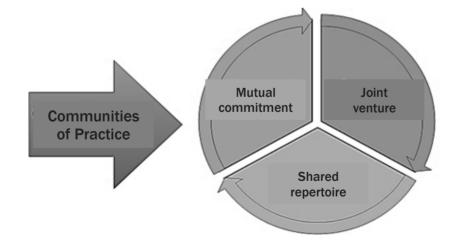Figure 1. Elements that make up communities of practice

Source: own elaboration from Wenger (2001)

These three aspects particularize the communities of practice, and it is possible to establish a correlation between them and a group of professionals such as teachers in an educational establishment. It is intended to use this type of social structure as a way of conveying the main concerns of primary school

teachers towards a path of progress, which they will try to develop no longer alone, but as a team. This group will join their ideas, feelings, expectations and will try to give them attention as a whole. In addition, ways of doing things will be shared, which, when disseminated among peers, will enhance the range of pedagogical approaches that will be available to teachers who are ready to seek different ways to innovate their classroom practices to improve student learning.

The opportunities that arise from this social construct are valuable for the education sector, since it provides a platform that collaborates in the creation and implementation of improvement proposals aimed at empowering teachers through the exchange of knowledge acquired during their teaching practice and enriched by teamwork. When analyzed from these three pillars, it is possible to glimpse the opportunities that arise from combining them in such a way that they articulate a common goal. Thus, the joint venture is related to the mission of the educator who wishes to guide a formative process in his students, while the mutual commitment has more to do with the characteristic of the group affiliation that invites the members to participate in a joint work agreement, and the shared repertoire is manifested in the reflection and construction of attractive methodologies for the teaching of school mathematics.

Zea and Acuña (2017) define CoPs as a flexible organizational system that favors the exchange of knowledge and experiences in an environment where interactions and cooperation enrich learning contexts. According to Giraldo & Atehortúa communities of practice are presented:

> As a knowledge management strategy that allows integration, understanding, mutual commitment and shared repertoire of intangible resources, which is the result of a shared practice of people and their knowledge from the spontaneous formation of the community (Giraldo & Atehortúa, 2010, p. 143).

McDermott (1999) mentions that the key to driving change toward knowledge sharing is likely to be found in communities of practice (p. 116). This statement generated great interest in studying how a proposal aimed at improving mathematics teaching could be structured using this organizational configuration. In this sense, Perez (2011) mentions that communities of practice offer an opportunity: To learn in another way, participating and appropriating distributed knowledge (p. 26). Thus, within this type of organization, the interaction between individuals seeking to solve problems is favored, facilitating access to each member of the community to the knowledge that each member possesses and places at the service of his or her peers. In other words, the level of application of communities of practice has to do with a group of people, with common interests, examining a specific problem and deciding to act to solve it by involving ethical, moral and political knowledge (Barragán, 2015, p. 173).

According to Godói de Sousa and Eiko (2013) CoPs constitute one of the most valuable structures in organizations that consider knowledge as a central resource, where free thinking is a fundamental capital. In this regard, Jubert (1999) states that this new form of organization that is emerging "promises to complement existing structures and rapidly boost knowledge, exchange and learning" (p. 24). These research studies point to a horizon of constituting possibilities for supporting the educational system, since according to Vásquez (2011), communities of practice: They have proven to be structures in which knowledge is shared and circulated (p.21), and similarly, Rodriguez (2007) states that communities of practice would be a key variant to consider in order to understand the processes and mechanisms of educational influence that occur within formal institutions, and which traditionally pedagogical reflection had only been able to name, but not to understand in its way of acting (p. 12).

The above coupled with the phenomenon of "thinking together" in community provides a deeper understanding of the structural elements of Wenger's (2001) communities of practice and it develops: "The creation of avenues to reflect on a regular basis on real-life problems that people really care about" (Pirko et al, 2016, p. 15). This reflective element encompasses innumerable meanings on which it has been theorized in depth. So, Perrenoud (2011) states that reflective practice when it occurs during action "consists of asking what is going to happen, what we can do, what needs to be done and what is the best tactic; what guidelines and precautions must be taken, what risks exist" (p. 30), while if the reflective practice occurs on the action, it refers to "taking the action itself as an object of reflection... and if the action is fulfilled, it allows then, to understand, to learn, to integrate what has happened" (p. 31). It could be said that a practice is

reflective if it becomes a form of existence within an organization, mobilizing and adopting measures that bring a sense of preparedness and coherence to what may emerge.

Cubero and Sazatornil (2013), for their part, find that the result of reflecting in a community of practice derives in a type of horizontal relationship in which there is mutual respect and listening, which allows participants to position themselves as valid interlocutors (p. 424) where the expert and the other members assume the task of establishing shared knowledge by setting common goals (p. 425). Therefore, the changes that really achieve some kind of transformation of classroom practices are those produced by the teacher's reflection between the act of teaching and the context in which the educational process unfolds.

The CoPs are used not only to train or update practicing educators, they are also used to reproduce processes of self-knowledge (Agudelo and Lovera, 2017), so they could extend a communicative bridge between individual reflection and community reflection aimed at improving the teaching of mathematics. According to Castellanos (2015), it is only possible to improve teaching practice if teachers change their attitudes and behaviors when performing their exercise. Thus, what this type of social organization provides is a platform for transformation that manages the pedagogical strengthening of the school. However, it is always necessary to keep in mind that it is not only used to exchange practical knowledge resulting in a purely instrumental use (Trust, 2015) wasting the construction of identities that generate meaningful bonds among its members, as Wenger (2001) points out.

Methodology

This review article shows the systematic search for a documentary analysis linked to two fundamental and interconnected elements of this research. To achieve this, research articles, books, papers resulting from research, master's and doctoral theses on existing Communities of Practice in the field of education, especially those related to the area of mathematics, have been analyzed. The *Scopus*, *Google Scholar*, *Scielo*, Dialnet and ERIC databases were used to determine the depths reached and the challenges generated. The bibliographic review was limited to three levels of public education in Colombia, namely: university education, secondary and middle school education, and primary education. The following table shows in detail the documents found and analyzed in this regard.

Table 1. Documentation of the search process

Relation	Type of Document				
	Scientific article	Presentation	Master's Thesis	Doctoral Thesis	Book
Theoretical Framework	11	4	-	-	3
Higher Education	15	6	-	-	2
Secondary Education	19	3	-	3	-
Primary Education	2	4	1	-	-
Total	47	17	1	3	2
Grand total			70		

Source: Own elaboration

Communities of practice in educational contexts

In University Education

The construction of CoP in university education (also known as higher education in Colombia) refers, in the first instance, to characterizing teachers by focusing on what they think is relevant and significant in the development of their practices (Morales and Flores, 2013). However, it is necessary to consider the contributions of the participants in equal measure, as well as to stimulate trust, which will allow the germination of a feeling of mutual ownership of a planned initiative (Morueta et al, 2009).

Some authors such as Bozu and Imbernon (2009) affirm that

> creating CoPs that promote collaboration and cooperation among teachers and the exchange of practical professional knowledge is one of the best alternatives for a teacher training model oriented towards the creation of spaces for reflection, training and pedagogical innovation (p. 5).

According to these authors, the CoPs leverage teaching improvement processes within educational institutions. Thus, from an operational perspective, the CoPs would be responsible for, among other things:

- Detect successful experiences so that they are systematized and socialized as part of the development of the curriculum.

- Generate spaces for reflection on teaching practice.

- Learn about the experiences of others (Almánzar, 2013, p. 80).

It is interesting to note that the CoPs provide a framework that has the potential to support the improvement of teaching and learning processes, as Camargo (2010) argues, who complements this idea by stating that "it is possible to use communities of practice in teaching to modify the traditional way in which there is a teacher who excels and students who are supposed to learn" (p. 373). (p. 373). This highlights two important elements, namely: the characteristics of communities of practice in university education and the particular application that could be made of them in the teaching of mathematics. This idea is reinforced by Avalos (2011) when he states that a community of practice can produce an almost symbiotic process between the generation of knowledge through the experience of collaborating on specific issues or situations and the emergence of leadership that makes its effectiveness possible" (p. 250). These elements show that the implementation of the CoPs provides methodological elements for the improvement of university education. Their challenge is to think in real and meaningful spaces that help represent teaching and its complexity for making good decisions (Ravanal, 2016, p. 23).

Some of the research on CoP developed in university settings is aimed at strengthening the process of training and monitoring practicing teachers in basic secondary education. For Bozu and Imbernon (2009), these CoPs have become "a space for the exchange of visions, experiences and practices that have facilitated a rapprochement between novice and experienced teachers and a shared and personal reflection on teaching" (p. 5). This exchange allows the flow of information in two directions, so that the subjects are transformed in the act of constantly interacting. For Cordero (2013) these interactions between expert and novice teachers promote "observation, dialogue, experimentation through trial and error, the planned and regulated exercise of reflection in and on practice" (p. 833). For Solomon et al (2015), feedback from mentor teachers to future teachers is necessary because it nurtures the group counseling process that promotes the pedagogical strengthening of the novice.

In other research approaches, there is a special focus on reviewing the role of teacher reflection in community practice. For Shön (1982), reflection through action allows the individual to become aware, and this is an indispensable element in the transformation of practices. Indeed, Córdoba (2013) states that the generation of reflective spaces in CoPs enables individual and collective strengthening that will lead them to overcome any obstacle, and, along the same lines, Chacón (2006) comments that the use of CoPs in university education promotes reflective teaching strategies that consolidate the autonomy of the community. In this way, the CoPs foster the improvement

of teaching performance by promoting quality management around their practices. For Roig and Rivera (2008), the constitution of a CoP promotes the appropriate individual and group environment to engage in reflections aimed at improving their educational practices and consequently to achieve learning with understanding of their students.

For some other researchers, it is very important to analyze the role of the Cops in training related to practice, in order to trace routes of pedagogical qualification. Thus, Ramos and Manrique (2015) indicate that CoP members express their interest in deepening the contents addressed and transformed in the same educational process by adopting the perspective of using classroom practices as elements of peer learning. According to Da Silva (2010), this vision encourages the evaluation of a given class to be reviewed as a whole, making the necessary adaptations under a process of negotiation of meanings that results in a common repertoire of the different ways of intervening in the classroom. Vargas et al (2019) strengthen this position by stating that the CoPs enrich interdisciplinary dialogue by stimulating collaborative work among academic peers, since it improves the teacher training process and becomes a platform for transversalization of the knowledge to be taught.

 Sabulsky (2016) indicates that the CoP has the potential to serve as an enabling environment to lose fear and gain confidence in the face of a task that the teacher had to face possibly alone in the classroom (p. 8). This aspect points to serious indications that the CoPs enhance good teaching and serve to visualize implementation paths for school improvement. In addition to this, Ortega and Hernández (2015) mention that it is "feasible to create new CoPs in the future, since it provides teachers with a way to improve their daily work, in addition to representing the opportunity to transcend in their daily work inside and outside the classroom" (p. 91), considering that "by promoting communities of practice in educational institutions, better classroom proposals will be achieved with more holistic and contextual approaches that contribute to form reflective and participatory citizens" (Edwars and Rebollo, 2010, p. 13). Therefore, it is plausible to highlight that the practice developed in communities "makes possible moments of reflection and discussion, sharing of experiences, creation of affective bonds and mutual respect, as well as features of professional development and constitution of the teacher's identity". (Rodrigues y Manrique, 2015, p. 985).

Regarding the research approaches used, most authors express their inclination for qualitative research. Hence, authors such as Anguita et al (2006) affirm that it allows them to develop tools for classroom work in the classrooms, as well as to investigate them (p. 162). In a similar context, the research developed by Aydee (2015) also resorts to a qualitative perspective with a methodological theoretical framework of narrative research of hermeneutic and narrative cut with a content analysis strategy. Meanwhile, Cordero (2013) investigates from an interpretative perspective developing a logic of conceptual generation through a case study seeking "to apprehend the complexity of the case without the intention of establishing generalizations, but understanding this type of inquiry as an engine of reflection on the subject and the understanding of the case under study" (p. 832). Roig and Rivera (2008) promote as the main objective of the CoP the teaching of the action research methodology as they use it in the development of the activities.

This research shows the enormous range of possibilities offered by the use of CoPs in the university. Moreover, this type of social structure could "evolve into a community of inquiry and practice as more and more practitioners and researchers become involved with the community, the influence it exerts will be transformed as it continues to grow" (Cheek et al, 2009, p. 237). This would contribute according to Morales and Flores (2013) to recognize the educational act as "a social fact in which participation gives rise to a process of learning and building knowledge" (p. 117). Even, this type of processes is possible to develop them in online CoPs, since, according to Ekici (2017) through the active participation of teachers it is feasible to develop skills such as critical thinking, which leverages the processes of educational transformation. However, it is important to keep in mind that in this type of CoP there may be large differences in level and participants may have difficulties in managing macroworking groups (Torres and Soriano, 2015).

In Basic Secondary and Middle School Education

In basic secondary education, research has also been conducted that emphasizes the advantages of using CoPs to leverage improvement processes in various contexts related to teaching. For Bustos and Moreno (2008), thanks to the reflections within the CoP of teachers who

teach mathematics in basic education, "access is gained to the curriculum and other educational processes with decision-making power, analyzing the correspondence between curricular proposals and what actually occurs in teaching practice, i.e., it becomes possible to couple theory and practice" (p. 5). For his part, Parada (2011) states that one of the most important findings of research on CoP "is the theoretical and practical contribution that allows teachers to guide the reflection processes before, during and after their classes" (p. 262). In the words of Murcia and Bustos (2000) "allows secondary school teachers to give
meaning to knowledge by giving it value through the elaboration of meanings that can be achieved through negotiation within the communities of practice" (p. 7), that is, communities of practice of teachers allow their members to give new meaning to teaching
and learning activities through the integration of varied and new processes of application of educational dynamics.

The research by Gonzalez et al (2013) found that CoPs in basic secondary education

> foster continuous and relevant communication among fellow teachers, seek a better understanding of their practices and those of others, encouraging the exchange to take place in an environment of respect, openness, maturity to receive and make constructive criticism (p. 110).

This element encourages the generation of renovating initiatives within an educational institution, because through the cohesion produced by having common objectives, a path of construction of solutions from within the establishments is visualized, supported by an organization that unites wills and proposes alternatives that can be adjusted to any particular context.

A benefit that Valdés (2010) suggests is that if

> collaboration, communication, interaction and socialization are to be fostered in students, these must first be promoted among teachers and that by creating a CoP of teachers, teachers can be motivated to collaborate in a process of educational change, and at the same time, the positive results generated by this grouping can be expected to last. If teacher collaboration is continuous and long-lasting, student learning outcomes will be better and better (p. 6).

The above is evidence that communities of practice transform educational practice, since teaching competencies will be developed according to the individuality of the teachers and their subjective ways of teaching that are integrated through permanent socialization in each meeting space of the CoPs and that enrich the learning of the teachers that compose them by modifying the dynamics of teaching and learning in the classroom. In this regard, González (2014) refers that in the communities of practice "the teacher is the protagonist of his own training" (p. 196); an issue that enables the empowerment of teachers to be recognized as an element that generates pedagogical stakes. A mobilizer of educational improvement tools.

From the perspective of teacher training Cyrino (2016) comments that proposals that value the experiences, repertoires and knowledge of those involved, as well as the development of learning through negotiations of meaning, are the most appropriate for the teacher qualification process. In that regard, Conde et al. (2017) argue that "the analysis of participation in the repertoire of practices provides elements to characterize how a CoP can influence teachers' professional development." (p. 456). Supporting the sustainable development of a group of teachers requires a mentality open to change, which enables the exchange and feedback of opinions stimulated within the CoPs (Jho *et al,*2016). Thus, the learning process is carried out as a whole "generating interactions among the members of the community itself through discussions, proof that a social approach in teacher training can be realized through CoP" (Sanz and Pantoja, 2015, p. 125). However, participation in such communities "will be ineffective if it is not accompanied by a determination to change on the part of the teacher and to implement new ways of carrying out his or her classroom practice" (Vallín, 2013, p, 71).

For this reason, it is important to have leaders within the group who, when accepted by the CoP, assume the function of unifying actions, distributing information, organizing the work and ensuring the correct functioning of the group's evolution (García et al., 2008). These roles are made explicit when each member acts as teacher and tutor to the others, plan community activities, and develop tools and frameworks that are part of the community's common knowledge (Vargas el al, 2016). Thus, the leadership within the CoPs makes explicit the informal transfer of

knowledge within networks and social groups by offering a formal structure that allows acquiring more knowledge through the experiences shared within the group" (Mayorga, 2014).

Another important element to consider in this type of structure according to Graven (2004) is the development of trust, because according to him, trust should be an aspect of Wenger's social theory of learning (explicit in the CoP). Together with meaning, practice, identity and community, it would stimulate leadership that enables the development of learning within the CoP (p. 2). The factor of trust puts on the table human relations as the primary gravitational element in the construction and implementation of social organizations, especially those in which not only ways or ways of doing things are shared, but also where personal visions are exposed about the ways of being a teacher or teacher of mathematics, an area for which, in most cases, no primary school teacher in Colombia has been formally instructed, to mention just one example. It is relevant to indicate that, in a school environment characterized by trust:

> The emergence of teaching talent will be related to the possibility of coordinating and managing tasks, but also of recognizing the potentialities of others, of encouraging their initiatives, of opening spaces to establish dialogues and overcome the tensions that the interaction of different rationalities causes" (Barrios et al, 2019, p. 87).

This aspect feeds the flame of commitment and favors, without hesitation, the consolidation of CoP in the education sector. Particularly in the area of mathematics, it was possible to review several research studies that reveal that to the extent that a practice is built on the basis of negotiation between students and teachers, a domain of knowledge that supports such practices is constituted (Braz and Kato, 2015). Thus, the social presence of the teacher within the Mathematics CoP is to be a learner and a teacher at the same time (Back and Pratt, 2009). This can be fostered according to Broomes (1989) with "rich" classroom activities, which "allow connections to be made between different areas of the curriculum within or outside of mathematics, thereby broadening its picture and meaning development" (p. 122). With this, the teacher becomes someone who participates in the process without being the main protagonist, encouraging the student to find a way to appropriate the knowledge, which when put into practice will become meaningful and relevant to their learning.

On the other hand, Siemos (2009) considers that the most valuable aspect in understanding CoPs is their value in reformulating problems that eventually become part of their shared repertoire. Therefore, engaging teachers in exploring level-appropriate mathematics content and providing teachers with opportunities to share ideas is a critical aspect of successful CoPs (Hodges & Cady, 2013). From this perspective, the CoPs can function as laboratories for the generation of classroom research proposals designed jointly by teachers and researchers in which both groups contribute their knowledge and participate together in their development in the classroom, as stated by Greca and El-Hani (2015).

In Elementary Education

The number of research studies that relate CoPs to primary education is notably lower compared to university education or to secondary and middle school education, which immediately points to an opportunity to increase educational research at this academic level. Even so, some researchers have found strengths and potentials for the improvement of primary education using CoP.

Encinas' research (2011) records the creation of three CoPs: urban, rural and multigrade indigenous communities, showing that these teachers' collectives were aimed at visualizing useful pedagogical elements of their teaching practice. While Aguirre (2015) shows progress by preconceiving a research process where he used the strategy of forming a CoP with a group of teachers interested in improving their classroom practices, resulting in a mobilization of teachers to inquire about the problems they face and to "jointly formulate improvement projects benefiting from the shared experience and at the same time recognizing themselves as capable of providing valid solutions to emerging problems" (p. 4).

López et al (2011) state that teachers "have responded better to the call to unite and work together when the referent was the identity of the school than when it was the pedagogical theory" (p. 126). Arguably, primary school teachers in general feel a greater attraction

towards teamwork when it is generated from their sense of belonging to the educational institution, than when they are invited from theoretical approaches, that is, they show a greater appreciation for the factual and contextualized approaches because they are closer to their professional practice.

As reaffirmed by Orjuela (2016) when reporting that in the CoP teachers find it important to improve their practice by counting on their colleagues and communicating their own experiences with their peers in search of a greater sense of belonging. Likewise, "they favor the professional development of teachers by promoting multiple dynamics of participation and collaborative work among teachers that allow improving the educational process from the perspective of the context" (p. 1785). Perez et al (2013) find that one of the aspects of the school that most favors the creation of a teacher CoP is the leadership of the principal, "which is reflected in the way the educational institution stimulates the formation of such communities" (p. 81), i.e., regardless of the geographical location of the members, it is important to have a cohesive factor, such as that of a teaching director. This research with that of Murillo and Pesqueira (2014) complement each other, as they state that "through the learning that teachers achieve in the CoPs, it is possible to optimize resources and obtain tools to detect and solve the institution's priority areas of opportunity" (p.28). It is clear that the research conducted strongly supports any inclination to use communities of practice in the educational system.

These aspects are considered essential to develop a sense of responsibility that pushes teachers to improve classroom practices, because as Giraldo and Quintero (2014) indicate, academic performance in standardized tests is linked to the "academic and professional training of teachers, to innovation and constant research that generates different visions and broadens the conceptual background of teachers" (p. 89), and therefore better learning opportunities for students. Thus, enrichment is within the reach of teachers in general and primary school teachers in particular, who, given the circumstances, in most cases express their desire to increase learning in their classes, particularly in mathematics.

Conclusions

This bibliographic review made it possible to visualize the strengths and opportunities that emerge when using CoPs in the educational system, as well as the progress made in their implementation in the different levels and contexts analyzed.

Consequently, it can be affirmed that this type of organizational structure is being used as a platform to promote the improvement of educational processes within universities. This is clearly made explicit in the promotion of an environment of trust that stimulates collaboration among peers; in the generation of reflective spaces as a basis for the qualification of pedagogical practices; in the corresponding management of knowledge encouraged by the interdisciplinary exchange of knowledge; in the configuration of shared repertoires of jointly reviewed and reflected practices, in the promotion of qualitative research methodologies that recognize the subject as an active agent of the problem and in its emphasis on serving as a structure through which the process of execution of the intentions of improvement and transformation incubated within it is articulated.

In secondary and middle school education, the focus of the use of CoP is linked to improving teaching, strengthening disciplines and sharing methodological strategies that can be replicated in individual classroom practices. Likewise, reflective dynamics on teaching performance are encouraged, as well as the possibility of sharing knowledge within the reach of all CoP members, generating a mutual commitment and a sense of identity that emerges and leverages the achievement of common goals. In addition, the communication channels that provide the level of understanding necessary to establish a negotiation of meanings as a basis for understanding the educational context are strengthened. Therefore, it is essential to have active leadership within and around the CoP in order to support the structuring processes required to optimize the professional development of teachers.

In primary basic education, research on CoP is much lower than in the previous two levels. One conjecture for this to happen is perhaps the lack of a link between the different educational levels that would allow the primary school teacher to become immersed in a research dynamic. Another aspect is that teaching in primary basic education is a situation of such dedication that the teacher of this level does not have the necessary time to subscribe to research groups. However, in the articles reviewed, it is possible to note a marked tendency to privilege the practical elements from which the members of a CoP

can benefit. In other words, elementary school teachers favor training spaces if they are mediated through practical activities that can be replicated in the classroom.

However, it is also important to mention that a series of shared characteristics are evident in the three levels of education analyzed:

- Reflection as a self-revision mechanism.

- Knowledge sharing as a symbiotic process of team collaboration and cooperation.

- The development of trust in each other and in the CoP, as a recognition of a mutual commitment and joint venture.

- The emphasis on the use of a qualitative methodology, clearly designed for transformation processes that promote the improvement of the initial circumstances that gave life to the project.

- Stimulation of leadership among CoP members in order to align efforts and wills around the group's intentions.

To conclude, in the words of Murcia (2014) "what defines the success or failure of successful educational institutions in comparison with those that are not, is the configuration of communities of practice within them, which generate common ways of assuming the human being, society and the world" (p. 45). In other words, the structuring of a CoP of teachers would stimulate its own and contextual improvement of the conditions that promote the quality of teaching in an educational institution. According to Hernández and Flores (2013), in the case of mathematics education, "a CoP is constituted by a group of teachers who learn in their activity, negotiate meanings about teaching action, generate opportunities for professional development and improve teaching in particular contexts" (p. 106). Therefore, an opportunity to contribute to knowledge from qualitative research that seeks to determine the effects of cultivating a CoP within an educational institution with elementary school teachers whose purpose is to improve the teaching of mathematics through reflection among peers and the generation of bonds of trust that promote their development is visualized.

Undoubtedly, these characteristics promise excellent results for the implementation of a CoP in an educational organization. However, its effects could be greater, as Vasco (2015) says, if a true articulation were achieved between the preschool level and the primary level; between the primary level and the secondary level; between the secondary and middle school level and the university, bridges of curricular and professional understanding would be formed that possess a common vision and produce results in line with the social needs of the context. On the other hand, if the teaching managers were expected to carry out their role as pedagogical leaders, teacher initiatives that have as a fundamental principle the collaborative work in a joint venture whose mutual commitment is such that the shared repertoire emerges for the benefit of all could be strengthened. It is therefore necessary to envision new lines of research that complement what has been investigated and expand to other areas of knowledge, as well as to other educational levels (e.g., preschool, adult education), and to processes such as learning, curricular programming, school organization, classroom environments, community management, and as many others as the context allows and requires.

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