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**THE LESSON STUDY MODEL
IN THE PROFESSIONAL DEVELOPMENT
OF MATHEMATICS TEACHERS:
THE CASE OF ELEMENTARY SCHOOL LEARNING COMMUNITIES**

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Acknowledgments

“The only thing that will stop you from fulfilling your dreams is you”

(Tom Bradley)

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Abstract

This research study addresses the issue of the professional development of mathematics teachers in elementary schools who have participated in a professional learning community, with focus on the model of peer learning according to the lesson study model in the process.

The objectives of the research study were to identify the teaching-learning processes that contribute to the knowledge and skills of teachers who belong to the professional learning community and to examine the influences of peer learning on the professional and personal development of the teachers in the community according to the lesson study model.

Research Questions

1. Which processes of teaching and learning in the professional community improve the teaching practices?
2. What are the characteristics of peer learning as they are expressed in the pedagogical discourse following the lesson study?
3. How do the characteristics of peer learning influence the professional development of the teachers in the professional learning community?
4. How do the characteristics of peer learning influence the personal development of the teachers in the professional learning community?

The research study followed up after the development of the professional identity and personal and professional efficacy of the teachers who participated in the community in the advancement of the learners' achievements. Thus, it followed up after the change of consciousness that occurred among the teachers, as well as after the building of knowledge, the formation of norms of cooperative learning, and the cultivation of a pedagogical discourse that has at its basis lesson study. In addition, the research examined the implications of the professional development model that is based on peer learning and includes practice, theory, and implementation as a way to cultivate teachers with skills and abilities commensurate with the 21st century.

Research Instruments

The researcher chose to carry out a qualitative research study, with emphasis on ethnography, in the spirit of the constructivist paradigm that focuses on the processes of the creation of meaning among the respondents and not on causal explanations. The researcher guided the community sessions that were held in the different schools in the city during one school year, from September 2017 to June 2018. The sessions were held once a month, and the duration of each session was about four hours.

This research approach enabled a complete and reliable picture of the events and phenomena to be obtained as they occurred in the community of teachers. The main source of information upon which the research depended is in-depth structured interviews that the researcher held with the respondents.

Research Population

The research studied a group of twenty teachers of mathematics in elementary schools (in the center of Israel) who participated in a professional learning community for the duration of one school year. The teachers – some homeroom teachers, some subject teachers, and some role-holders such as subject coordinators – were chosen to participate in the professional learning community following the recommendation of the principals of the schools where they are employed. The characteristics of gender, work experience, position, education, and professional development of the teachers were different, so that the research group was heterogeneous.

Research Findings

The research study presents the professional learning community as a model of pedagogical innovation from three aspects – personal, professional, and social. The personal aspect is expressed significantly in that in the analysis of the interviews it was not possible to separate between the cognitive thinking and the emotion. The research study found that the personal aspect is composed of emotional and instrumental experiences, which give the teachers opportunities to build knowledge, acquire skills, and build applied tools with the integration of self-awareness as a part of their professional development.

Among teachers feelings of security, respect, empathy, and personal satisfaction became established because of the feeling of self-worth, self-efficacy, and renewal.

In the professional aspect, the learning community operated around the knowledge field of mathematics and pedagogical topics that arose following joint lesson study. Emphasis was placed on the sharing of the teachers' professional experience, on joint thinking and discussion, and on investigation of the ways of teaching and reflective analysis. The teachers in the community implement mathematical contents in the best teaching practices, exhibited expertise in the content field, and promoted the learners' achievements. During the year the teachers acquired knowledge commensurate with the skills required in the 21st century, adjusted teaching situations to changes in the classroom, made flexible patterns of thinking, and extended the ways of learning to new channels.

In the social aspect, the researched community saw the formation of an encompassing set of social aspects and a "climate" of relations of trust, a supportive environment, and attention, alongside norms of collaboration, teamwork, and peer learning. This framework made the group of teachers one that holds reciprocal relationships of consultation, support, companionship, and even enjoyment. It was found that the teachers desire more than anything a professional encounter with their colleagues and are willing to contribute from their abilities and knowledge in local and system circles.

Challenges in the Establishment of the Professional Learning Community

The main challenge the teachers in the community face was to integrate between the group cohesion and their place as individuals in it, as well as between the desire to lead and be prominent as an individual teacher and the need to be a partner in the group – in both the personal aspect and the professional aspect. The teachers were forced to abandon their individual approach in favor of collegiality, teamwork, and cooperation.

Conclusions

In this research study, the professional development of teachers was apparent in the broad context that addresses the professional culture of collaborative professionalism, which creates change in the perception of the teachers' professional learning.

In the research community, patterns of acceptance and reciprocity were created between the teachers' development as individuals and the development of the community as a professional collective. The research findings indicate that the teachers felt that their membership in the community gave them a significant advantage. Their self-image rose and constituted a fertile ground for the building of a safe learning space and the performance of reflection on their ways of teaching. The community enabled every teacher to develop in a personal and professional manner as a partner in active and continuous learning.

The teachers shared the professional responsibility, opened the "door of their classroom" to their fellow teachers, and shared insights that arose from their participation in the community. An important conclusion that arises from this research study is that the community created for the teachers an opportunity for a different learning, which is participative and inclusive, which includes the analysis of evidence on the basis of the observation of lessons. The perception of the teachers as human capital created a learning environment responsive to the needs of every teacher in a constant process of learning, support, and joint cultivation of new patterns of thinking.

Implications and Contribution

The research study illustrates how a professional learning community creates an innovative, empowering, and dynamic professional development environment and thus has an applied contribution to the field of education. The process that the teachers in the professional community experienced over the year emphasized the strength of such a community in the identification of their needs and the focusing on the goals and led to the building of a unique model of the implementation of processes of inquiry, pedagogical discourse, and peer learning, the aim of which is the improvement of practices and the assimilation of innovative pedagogies in teaching.

The innovation in this research study is the unique model of professional development with sequence and continuity, which is held in the format of learning through experience in the field. This model is completely different from the traditional classic model of short-term in-service training courses that do not offer a learning process and are

“imposed from above” by the Ministry of Education and are not necessarily a solution to the needs of the field. It is possible to identify in the model components of the teaching of a best lesson: the teachers identify principles of teaching significant to the skills of the 21st century and are aware of the learning process that they undergo during the lesson study.

Applied Recommendations

The recommendation of the research study is to build in the system of education, namely the school frameworks, professional learning communities as a part of the teachers’ meaningful pedagogical and professional development, the goal of which is diversification, improvement, and innovation in the teaching processes.

Therefore, the recommendation is to build a process of professional development based on teacher agency and acknowledging its importance in the school framework; to constantly expose the teachers in the professional community to patterns of teaching and learning as a result of the work and not separate from it; and to allocate a structured and effective space for the learning community alongside professional accompaniment that cultivates a culture of pedagogical discourse.

It is further recommended to implement this model of pedagogical innovation not only in the education systems as a way to create norms of partnership and collaboration. Organizations that will adopt the principles of the model that we examine in this research study will lead to the creation of relevant knowledge and will develop the human capital through learning from the organization and development of decentralized leadership that will result in the growth of a new professional identity.

Introduction

Tell me and I forget. Teach me and I remember. Share me and I learn.

Benjamin Franklin

Professional learning communities grow and develop in a variety of professions and in different ways around the world, and in the past two decades in the education system there are learning communities of teachers as a part of the school culture and the track of the teachers' professional development. China and Japan are considered leaders in this field and in them there are inquiry groups of teachers with the goal of the improvement of the teaching through shared and diverse learning (Taylor & Gerstein, 2014; Toshiya & Toshiyuki, 2013). In the field of education, the concept of the "professional learning community" has developed from the daily engagement in the learning and teaching processes, and it addresses terms such as inquiry, reflection, and assessment (Ghousseini & Sleep, 2011; Lomos et al., 2011).

Learning communities in the field of education may be different from one another in their composition and in the context in which they operate, and nevertheless they share among them beliefs and values, for example, autonomy, collegiality, and efficacy, and enable the teachers to re-think their practices, to establish new roles in the classroom, and to teach differently from the traditional ways in which they taught in the past. The activity of the professional learning communities is a change of paradigm in the school culture, at the center of which is an invitation for innovation and change in the ways of teaching and learning, for the continuous improvement of the students' achievements (William, 2013). The learning communities create an environment that cultivates cooperation, open professional discourse, and commitment to growth and development of each one of the community members and the entire community.

Research studies carried out in the world indicate that the professional development of teachers in school communities contributes to the improvement of the teaching and to the quality of the teaching contents. The professional development in the learning community is commensurate with the teachers' needs and enables them to feel ownership

of the process and of the knowledge incorporated in it through the choice of the topics taught, alongside the examination and re-formulation of concepts and ideas associated with their work (Dagen & Bean, 2014; Lieberman & Miller, 2016; Nehring & Fitzimons, 2011).

Learning communities attribute importance both to theory and to practice. They encourage the re-examination of the professional functioning, propose and examine the implementation of new ideas, and provide opportunities for the involvement of the peers in the knowledge and for the joint creation of new knowledge (Fullan & Hargreaves, 2016).

The changes facing us in the 21st century have considerable influence on the way in which the goals of education are defined throughout the world and in Israel. The education system in Israel is found in processes of renewal, improvement, and development of professional abilities focused on the teachers' professional development. The understanding is that the teachers are the key to and cutting edge of the success of the educational activity.

The teachers are the ones who deal with the translation of theoretical ideas to words and deeds; they are the ones who engage day in day out, hour by hour, with the interaction with their students. They are the ones in whose classes the pedagogical, educational, and value-based reality is shaped. Thus, it is clear that to cause a change in the teachers' professional development it is necessary to provide them with a supportive and significant learning environment like a professional learning community.

As an instructor for the teaching of mathematics in the elementary schools in the education system in Israel and as a leader of pedagogical change, I would like to assimilate the vision I support through the construction of professional learning communities. My vision is to cause a change in the traditional format of professional development through lectures of outside content experts. The change in which I believe is related to the creation of a new professional culture among the teachers of mathematics, which will be expressed in peer learning and in inquiry learning through experience.

As a result of my position in the accompaniment of teachers of mathematics in the schools, I consider to be very important the professional development held in the context

of the teachers' daily work, engaging in authentic problems from the field, based on data and representations from the work, and characterized by their partnership and active involvement in the pedagogical processes of learning and development. As an instructor, I provide the teachers I am instructing with the opportunities to take part in activities based on their practical experience as a part of the partnership in the professional learning community. I believe that the change of this paradigm will enable the construction of relevant, productive, and inspirational pedagogical knowledge.

In the spirit of the aforementioned statements, I chose to lead a professional learning community, the first of its type in Israel, of teachers of mathematics in elementary schools. This professional learning community is characterized by peer learning, lesson study, and feedback as an inseparable part of the routines in the community. All the teachers in the community are partners to learning, doing, and research, and in an ongoing and constant manner there is dialogue in the community between theory and practice.

The present research study examines the issue of the professional development of mathematics teachers in elementary schools that participated in the professional learning community, with focus on the model of lesson study in the process. The research objectives were to identify the teaching-learning processes that contribute to the knowledge and skills of teachers who belong to the professional learning community and to examine the influences of peer learning on the professional and personal development of teachers in the community according to the lesson study model.

The research study addresses the community of teachers who acts together so as to learn and to develop in professional and pedagogical terms. The mission of the professional learning community is to effect a change in the work and learning culture of the mathematics teachers and alongside this to examine the professional identity of the community members.

The chapter of the methodology will present the methodology chosen for the research study and will include the characteristics of qualitative research and grounded theory. In addition, the explanations of the choice of this methodology will be presented. The research will be based on in-depth interviews that constitute the main source of

information. In the continuation, the chapter will describe the inter-subjective relations between the researcher and interviewees and last will discuss the validity and reliability of the research study.

The findings and the following discussion will examine the influences of peer learning in a professional community of mathematics teachers in elementary schools according to the model of lesson study in the process. In addition, the quality of the teaching and learning processes as a part of the professional and personal development of teachers in the community will be examined.

The uniqueness of the research study is that it presents the importance of a professional learning community in the school framework. The research study describes the way of the formation of the learning community, focuses on its characteristics and advantages, and indicates the challenges in leading and establishing it.

The research study emphasizes the importance of the introduction of learning communities into the educational frameworks and of providing time resources, alongside system flexibility that will allow collaborations, participative learning, and peer discourse.

Chapter I: Professional Development in the Organization as a Theoretical Problem and a Part of the Contemporary Practice

In modern human society, a prominent phenomenon is of many organizations in all areas of life that include human capital, social capital, organizational capital, and the coordination between them, when they support one another and constitute a basis for the development of organizational ability (Heartsch, 2003). This is a process of development that connects between the personal learning processes and the processes of the creation and preservation of organizational knowledge. Another way of defining the development of organizational abilities is to improve the ability of the organization to perform tasks at a high level and in perfect coordination, with the maximization of the organization's resources, so as to achieve results (Hehalf, 2003).

The principle at the basis of the term of the development of organizational abilities is the maximization of the resources. The approach of the development of organizational ability broadens the processes of organizational learning into an organizational culture, as an approach that sees learning as a culture and way of life. Through this approach, the relationship between the processes of work, learning, and knowledge is steadily tightened. These approaches see reality as a process that is created in a regular manner on the basis of dialogue and interactions that people hold with their environment and in this way create themselves and their environment each time anew. In such a system of reciprocity, the workers are expected to take responsibility for their learning and development, and the organization is expected to enable a supporting environment that enables and promotes learning. The ways of learning become more dialogic, sensitive to difference and diverse, and the worker simultaneously learns, teaches, and develops knowledge. The individual is perceived as a part that develops and is developing in a constellation of the system of organizational abilities, and a high level of reciprocal commitment is created between the individual and the organization (Samuel, 2012).

The rapid pace of change that characterizes modern life, the rapidly advancing technology, and the steadily increasing accumulation of information make the environment in which the organizations act unstable and rapidly changing. The gap between the need for stability and permanence and the need for rapid change forces upon the organizations the need to develop the ability to respond rapidly and the ability to learn so as to adjust to ambiguous and changing situations. This learning ability includes skills of learning from experience, skills of solving problems independently, and skills of knowing how to share knowledge. The building of the abilities to do this successfully is the main part of organizational learning (Argyris, 2004; Senge, 1994).

Senge (1994) defined a learning organization as an organization that cultivates continually among its members new and creative patterns of thinking and encourages learning together, from a vision and shared insights that contribute to the improvement of the organization's abilities. The components of organizational learning, therefore, are the development of thinking patterns, learning in the team, and creation of shared insights with the shared vision.

The model of organizational learning that is forming today shifts the focus from the expert instructor to the learning worker and is different from the two generations of the model of instruction and learning that preceded it. The first generation model is the instructional model of learning based on the teacher, which sees the learning to be a personal process, in which the learner derives the knowledge from the teacher, the expert instructor. The second generation model is learning at work. The learning and professional development are based on the experiences at work and on the content world of the work and the profession. The main learning techniques according to this approach are mentoring, training, and practice, teamwork, and expert communities. This is a strategy based on experts that enables learning.

The new model of instruction and learning of the third generation is an ecological model, which broadens the learning process from the specific organization to the broad environment and the reciprocal relations between it and the learning person. The model is based on the development of abilities and relies mainly on an independent learner, who

also shapes and develops learning. The learning is contextual and integrates the broad world of the person who works so that the learner and the teacher develop and learn together. The approach is called life-based learning, and the fundamental assumption is that the learning that supports work performances does not necessarily occur in the work world and is not limited to its contents. Third generation learning is intended for the construction of ‘organizational wisdom’, which is one of the main processes in the development of the organizational ability (Staron et al., 2006).

The ecological approach to learning sets before organizations two main instructional challenges. The first challenge is the fulfillment of knowledge and skills that develop outside of the boundaries of the organization, and the second is the recognition and understanding of the non-formal learning processes that occur in the boundaries of the organization (Opfer & Peder, 2011).

Life-based learning broadens the perspective of organizational learning and opens for the organization new opportunities and possibilities. In a world where creative and ground-breaking thinking is required, the ability to see a problem from diverse viewpoints is a tangible advantage and an extension of the organizational ability (Murgatroyd, 2013).

In most professional organizations learning throughout the entire professional life is seen as a means for the acquisition of self-confidence and the development of the career, as a means for personal development, and simultaneously a means that enables the public of service recipients to be assured that the service providers are updated in their field of specialization (Noe, Clarke, & Klein, 2014).

The development of a learning culture builds the recognition of a number of basic characteristics of life-based learning: the importance of the development of abilities and the focus on the strengths and tendencies, the recognition of the existence of many diverse sources of learning, the recognition of difference as power, and the transfer of the responsibility for learning to the individual (Hallgarten, Hannon, & Beresford, 2015).

Avidar-Unger, Friedman, and Olstein (2011) define professional development as a process that occurs for the duration the role-holder’s professional career. This process

includes an implicit and explicit dialogue between the personal development and the professional-organizational development. In this context, professional development is examined in knowledge, skills, and abilities to achieve professional achievements in the field of the worker's specialization in the organization (Sheldon & Clark, 2012).

One of the problems recognized in the learning processes is the transition from one content world to another content world. In other words, the learning that occurs in the individual in diverse channels is not directed necessarily to insights or uses in the professional world. Here come in the thinking and planning of the instructional people in the organization and their ability to create the contexts and the correct mediation through very diverse and broad techniques such as conversations, techniques, training, active learning, creation of networks, and so on.

Since the end of the 1990s we have seen local initiatives, the signing of international conventions, and the steadily increasing recognition of the need to bring about a far-reaching change in the field of professional development of those who are found in the job market, primarily because of the tremendous and rapid changes that influence many areas of occupation. On this background, it is possible to more easily understand the wave of reforms in the education system in general and the professional development of the teachers in particular.

1.1 The School as a Learning Organization

The complex and competitive reality of the 21st century forces different organizations, including schools, to become learning organizations and to improve the quality of the educational process. This process is expressed in the location and identification of the structures and mechanisms through which the organizational learning is carried out in the school and in the attempt to reveal the reciprocal relationships between the structures and mechanisms of organizational learning and the organizational culture and educational vision that characterize the school as a learning organization.

The reality of these learning mechanisms largely enables the school staff to create new knowledge and to assimilate it in the routine and organizational arrangements of the

school, with the goal of helping the school effect continuous improvement. The organizational learning creates a model for improvement and change in education, since it includes elements of the change of perception, change of management, and change of systemic structures, alongside commitment to the advancement of the individual, who is the “product” of the education system (Oplatka, 2015).

Therefore, schools act according to innovative organizational perceptions that are derived from a systemic outlook on the relations between the individual and the inclusive context in which the individual operates. At the focus of these changes is the renewed definition of the teachers’ roles, which includes the extension of their roles beyond the classroom.

Although the handling of the student and the class is at the center of the teacher’s work, they act in broad organizational frameworks, which encourage collegial and cooperative work relations and cultivate a sense of organizational involvement in the school (Learning Forward, 2011; Linder, Post, & Calabrese, 2012).

The renewed look at the organizational aspect of schools places before principals and teachers new requirements and challenges, re-defines their traditional roles, and shapes them. Teachers today range from individuals to a professional community, when their viewpoint changes from one that focuses on the class to one that addresses the school as a whole organizational unit. (Katzenmeyer & Moller, 2009; Michaeli, 2016).

The way in which the teachers perceive the school as an organization is expressed in the making of shared decisions that are related to the school objectives, to the joint development of learning programs, to the joint performance of evaluations, and to the thinking about the ways in which it is possible to develop the work culture in the school and to support it. Teachers talk about the way in which it is necessary to organize the school and to manage it and about the way in which the school realizes its tasks. They present new ideas and help with the growth and the leading of the way to renewal. They can significantly influence the improvement of the school and the work of educational staff members, which in the end acts to benefit the students (Gavish & Friedman, 2011). The view of the school as an organization that cultivates new patterns of thinking that broaden

the knowledge and with which people learn continually how to learn together obligates the growth of partnership and the empowerment of all the participants (Senge, 2006).

The theory of institutional growth, as delineated in the book published by Senge (2006) *The Fifth Discipline: The Art and Practice of the Learning Organization* will be far more beneficial for adoption in the schools than most of the routines and procedures taken from other professionals. Senge (2006) defines a growing institution when it continually broadens its ability to create its future. To achieve this objective, Senge identifies five components or disciplines for action. If action is not taken according to all five disciplines, then the learning will be deeply harmed. If action is taken according to all five disciplines as planned and not in isolation, then there is the great potential for the improvement of the school and the teachers will become more involved in helping create a successful environment for learning, both for the students and for themselves (Senge, 2006).

The first discipline, systems thinking, is the conceptual framework for the organization. This is the discipline that includes the reciprocal relations between the different parts of the organization. Systems thinking maintains a view of circles (of behaviors and conducts) instead of a linear view (which focuses on isolated events). Systems thinking combines all the learning disciplines and outlines the learning organization. In true systems thinking, all the interested parties are a part of one system and there is no separate 'other'.

Senge (2006) sees the relationships in the organization to be a 'medicine' for the creation and preservation of a learning organization. With the relationships come dialogue, discussion, and the beginning of systems thinking. Effective school leadership needs to cultivate and develop the dialogue and discussions required for change.

The second discipline is personal mastery. Organizations learn only through learning people. The learning of people does not ensure the learning of the organization but is essential to it. The development of personal skills embodies constant clarification of what is important to us, constant learning how to see reality more clearly. The school will not become a learning organization if the employed do not learn; however, automatic personal learning does not necessarily produce a learning organization. Unlike other

reforms or programs compelled by outside sources, the basis of Senge's model requires continual bodies of learning and practice that people adopt as individuals and groups.

The third discipline is mental models. Mental models increase personal awareness and influence what we see and the way we behave (Senge, 2006). This discipline includes the effective sharing of what we think with others and enables our thinking to be open to the influence of others. Work with mental models develops the skills of reflection and inquiry. It is necessary to study all the time where we are captive of mistaken concepts and to attempt to dispute them. This inquiry paves the way for the examination of assumptions and generalizations about organizational practices. Thus, constant improvement is possible. The implementation of this discipline in education requires the creation of a new definition of leadership and an organizational structure in terms of making decisions.

The fourth discipline is shared vision. Personal skill and sharing of mental models are the basis for the creation of a shared vision. A shared vision includes the shared and collective objectives, values, and tasks that characterize the organization. The forging of a shared vision promotes trust among the work colleagues and creates a shared identity. Educational leaders can recruit the teachers to be involved in the creation of a school vision. When managers create the vision in isolation, the teachers do not feel they are partners.

The fifth discipline is team learning – the learning as a group is made possible through the integration between two complementary worlds: dialogue and discussion. Dialogue is the place where everyone suspends their previous assumptions and listens to others. When there is a dialogue, then the differences of organizational statuses are eliminated and every person acts as an equal. For the most part, it is recommended to use the help of the instructor, who accustoms the group to work in this way. Discussion includes the presentation of the ideas and the defense of them. A fine combination of both in constant movement enables the learning as a group (Senge, 2006).

To conclude, the change of the school into a learning organization requires leadership from the teachers and the commitment of the management along with other stakeholders in education. As the institution grows through learning, the influence needs to penetrate to the students through terminology and practices that are integrated in the

daily routine and in the vocabulary. When the school is a learning organization, the leadership trusts the staff, and the staff trusts the leadership. Decisions are not made top-down but through cooperation (Senge, 2012).

1.2 Professional Development of Teachers

The professional development of teachers is a new field in the education system in the recent decade, both around the world and in Israel. As a result, there has been a change that will shed light on the place of perseverance in the professional development of teachers in education systems in the world characterized by the influence of the online and digital environment in a changing reality. Therefore, the investment in this field steadily increases on the part of all the partners – governments, local governments, schools, and teachers .(Paz & Salant, 2012).

Professional development provides an answer to significant learning throughout the teacher's professional career, which includes active and independent learning and creative and critical thinking. Professional development is a process that derives from the teacher's practice and reflection. This process lasts throughout the educational career. The perception of learning throughout the career steadily increases in most of the countries of the world in all the professional occupations (lifelong learning). (Laal & Salamati, 2012)

Professional development is characterized by two fields. The first is theoretical knowledge on the teaching profession learned in the school, and the second is practical knowledge of techniques, skills, and actions that characterize the skilled professional (Bautista & Ortega-Ruíz, 2015). The processes of professional development enable an experiential learning environment that includes involvement in terms of the process and understanding in terms of the product. As the teacher will motivate and guide the learner to identify, process, critique, and create knowledge, to think, to ask questions, the teacher will transform her knowledge in actuality for the growth of the students. The teacher's professional learning is a complex process that necessitates cognitive and affective aspects (Avalos, 2011).

The perception of learning over the course of the professional life based on values, beliefs, and knowledge represents the urgent need to upgrade, maintain, and develop the profession through innovative solutions that generally are not found for bureaucratic and other reasons (Oren, 2010). Therefore, the teacher must hold processes with flexibility and choice and the extension of the variety of methodologies suited to the growth of meaningful learning (Farnsworth, Kleanthous, & Wenger-Trayner, 2016).

It is necessary to train teachers to work in a changing and unexpected environment, where knowledge is created from diverse sources and from different perspectives (Vidislavsky, 2007).

It appears that in the education systems in the world it is possible to identify a culture of collaborative professionalism as a process of learning and professional development of teachers in the learning organization. Successful education systems are based on a culture of professional collaborations between teachers, pedagogies that encourage the involvement of teachers and students, reciprocal trust, and routine and quality feedback intended to bring about improvement.

A culture of collaborative professionalism is characterized by the inseparable combination of autonomy and personal and group responsibility. It focuses on the constant improvement of the professional practice, on innovation, but not on changing fashions and commitment to pedagogical processes (Fullan & Hargreaves, 2016).

A culture of collaborative professionalism serves concurrently individual learning needs, learning communities of teachers, and school priorities. It enables the teachers to enjoy a higher level of personal wellbeing and professional satisfaction, which derive from their increasing ability to be autonomous and meaningful for their students, as educators and not only as teachers. It contributes also to the students' personal wellbeing.

A culture of collaborative professionalism includes a number of characteristics, when each one of them has a personal facet and a group or collaborative facet. The development of the individual is concurrent with the development of the group and from dependence on it. However, it is important to emphasize that a culture of collaborative

professionalism does not push everyone to behave identically, to adopt current fashions. Rather, the reverse is true; a strong culture of collaborative professionalism flourishes on the background of diversity and differences of opinion, encourages a variety of styles, strengths, and approaches, and develops the talent and personal and group judgment (Fullan & Hargreaves, 2016).

Like the duty of teachers in the 21st century is to learn and develop throughout their professional life, the duty of educators is to implement a different constellation of processes of professional development of teachers, which will express an ongoing continuum of learning, planned and structured (Lee, 2011). In other words, the teachers are required not only to be experts in their field of content but also to be fluent in the psychology of the child, skilled in communication, and able to perform strategies of class management and to meet the standards expected of them. This strengthens the opportunities for implementation and training in the engagement in problem solving and tools for coping with professional challenges, and methods of teaching and pedagogical issues adjusted to the 21st century. In addition, they are required to participate in frameworks for professional development. Professional development offers a collaborative means of existence and training to conquer collective challenges for the purpose of the growth and improvement in every educational institution, which is the milestone for life-long learning and career advancement (Hien, 2008).

Professional development should aspire to help teachers learn, to speak about their experiences in the class, to respect their practical knowledge, and to share their knowledge and experience with one another. The experiential knowledge and the insight that comes from teachers at all levels of the experience can be clarified especially as beneficial and educational. It should be noted that this process is influenced by the social processes in which the teacher is a partner through systems of relations and learning that exist in social reciprocal relations that support the construction of knowledge and understanding in the teacher (Farnsworth, Kleanthous, & Wenger-Trayner, 2016).

Brockett (2008) identifies that successful adult learning occurs in a culture of collaborative professionalism, which is characterized by a collaborative environment that

enables these teachers who share similar experiences to brainstorm problem solving but also to build an atmosphere of community and appreciation. Peer learning can continue after the activities for professional development have ended. This is an ongoing process in which teachers doubt and think about what they are doing, why they are doing it, what works, and what they believe is important and invites reflection. Reflection is a very important instrument in the teacher's development and as a main pedagogical method in teaching (Swanwick et al., 2014).

The answer to the issue of what the appropriate way for the ongoing improvement of the teachers' abilities and achievements are changes from era to era, following the changes in the individual's life and in society and changes in the field of education and teaching. In every period a re-examination is required of the world of knowledge, the thinking, the beliefs, and the perceptions and the ways of action of those who engage in the field of professional development of teaching staff, so as to respond to the unique needs relevant to the time and place (Rahn, 2016).

In light of these statements, the professional discourse found its way in the concept of 'life-long learning'. In other words, a teacher needs to be committed to learning throughout life and the environment needs to provide the teacher with the formal and informal instruments for this purpose (Hursen, 2016). In the teacher's professional development there is initial training and there is professional training during action. This is development that never ends (Kfir, 2009).

Teachers have the ability of independent learning, the ability to present questions, to research and to develop their knowledge in connection to existing theories, and with the construction of existing theories, and with the structuring of theories of their own, which they return to examine in the reality of their work. All these need a supportive school culture that encourages exploratory learning and revival primarily inside the school (Lieberman & Miller, 2016). In a school that is characterized by such a culture, the teacher is not isolated "behind a closed door". The establishment responsible for the training of teachers and their professional development must contribute its part in the arrangement of

the teachers' learning processes and coordination between the different sources from which the training is nourished (Kfir, 2009).

The model of Fessler (1985, in Day, 1999) describes the professional development of teachers as a dynamic and flexible process, influenced by the interaction between the stage in which the teacher is found, ranging from the stage of initial training to the end of the career, and two systems of variables: the circle of the personal environment that addresses the personality characteristics, the additional occupations, the factors of family, and so on, and the circle of the organizational environment in which the teacher functions that includes the expectations of the teacher, the style of management the teacher encounters, the requirements of the professional association, the public trust, and so on. The stage of the teacher's career touches upon these two systems of variables with their components, and reciprocal relations are created between the three systems: the personal environment, the work environment, and the stage in the career.

The establishment is responsible both for the continuum of the stages in the teacher's development and for programs for the teacher's development and for the examination of the products of the training and the development and is in charge of the improvement of the professional level and the cultivation of the professionalism of the teachers, so that the teachers' learning will not be eclectic but will focus on a goal or long-term goals. This does not exempt the teachers from their responsibility to develop but assigns on the education system the duty to organize and to enable the teachers to develop their role in the system from the beginning of their training and until its end (Avador, Rheingold, & Kfir, 2010).

The stages in the teacher's development and the programs that accompany and support her occur on the background of the teacher's abilities, personality, and experiences as an individual, as a person. Her entry data and life experience outside of the professional occupation are data and processes over which the system does not have considerable control, and it is necessary to see them as a datum that should be considered and even utilized in favor of the desired process (Avador, Rheingold, & Kfir, 2010).

The institutionalization of the teaching and its positioning as a profession necessitate the construction of processes of the broadening of knowledge and the abilities in the fields of the diverse engagements of teaching workers (Avador, Rheingold, & Kfir, 2010; Avalos, 2011). One of the instruments enabling this in the professional development is learning communities in which every one learns from one another. This learning enables empowerment, relevance, peer discourse, reflection, and so on. The members of the community share a vision, values, and shared norms, act in cooperation, hold reflective dialogue, collect and analyze data and evidence, draw conclusions, and perform changes so as to improve their teaching and the learning of the students in their classes. Therefore, the contribution of the teachers to their colleagues from the knowledge they accumulated in the professional development also enables the improvement in the students' achievements in the learning frameworks.

The discourse in the community of learners about the experience in the learned implementation and the feedback on their activity and their insights contributes to the deepening and implementation of the academic knowledge and to the learning of peers who contribute to one another both on the level of conceptualization and on the level of performances (Birenbaum, 2009; Hargreaves, 2013).

1.3 Professional Development of Teachers in Israel

The professional development of teachers in Israel is based on four systems, when the senior of them is system of the shapers of policy headed by the Minister of Education, and this includes the ranks of the headquarters and the supervision. These translate the policy into work procedures and supervise their performance. The second system in the hierarchy includes organizations that engage in actuality in professional development. The third system is the system of the field, and it includes a variety of educational institutions: schools, kindergartens, and other educational frameworks. The principals of these frameworks must implement the goals and general objectives formulated by the headquarters, as well as promote the fulfilment of the unique needs of the educational framework. The fourth system includes the teaching staffs: teachers, kindergarten teachers, and additional role-holders in the fields of education. These role-holders are the spearhead

of the education system, since they are directly responsible for the performance of the policy and the achievement of its goals.

The object of the Ministry of Education in Israel is to strengthen the professional status of teaching, from the understanding that the constant development of knowledge and skills throughout the teaching worker's professional life, in life-long learning, is vital for the preservation of quality teaching of relevance in the education system. The planning of these actions was undertaken along with the teachers' organizations: their main expression was in the 'New Horizon'¹ Reform and then more recently it is apparent in the 'Courage to Change'² reform. The 'New Horizon' Reform (in the elementary schools) perceives the learning and the professional development of teachers as a main objective and acts to achieve it through the setting of a system of guiding outlines that define the areas of professional development and the principles for achievement (Avidav-Unger, Rosner, & Rosenberg, 2013).

In the year 2015, in Israel there began to be attempts at professional learning communities. In three years this process became very established in Israel. The process caused a change in the manners of learning, in the professional development, and in the professional culture of teachers in the Israeli education system. From the year 2018 there are 800 professional communities of about 5000 teachers throughout the country. These communities create organizational and professional infrastructures and provide broad support of the productive activities of the school learning communities of peer teachers under the guidance of leading teachers as a substitute for traditional professional development (in-service training course) (Herut, 2018).

The Department for the Professional Development of Teachers began a process of the gradual and controlled implementation of professional development for teaching workers. This implementation will enable pedagogical and administrative flexibility in the

¹ The 'New Horizon' Reform is an educational and professional reform program in the elementary school and middle school beginning from 2008.

² The 'Courage to Change' Reform is an educational and professional reform program in the high schools beginning from 2010.

processes of professional development for the principal and his team, intended to improve the processes of professional development, achieve improvement in the teachers' work and in the students' achievement, and establish the principle of self-management in the schools. The flexibility will be expressed in the making of decisions and in the independent action of schools in this topic and will allow an appropriate response to the unique pedagogical and organizational needs of schools and their staffs (Mizell, 2010)

The school principals have a main role in the formation of the teachers' professional development: their support of professional development is essential, and they must cultivate a work environment that enables the development of quality teaching, collegial relations between the teachers, and reciprocal support. The principals' attitude and practical leadership are an important component in the organizational climate of the system over which they have charge. They must be aware of the teaching staff's needs for professional development and develop an organizational environment that supports changes and innovations. They may be a factor that increases the motivation of the organization's members to improve, and alternatively they may be an inhibiting factor (Grissom, 2011).

An important component of the principals' support is providing the possibility for the teacher taking in-service training to continue with the learning process in the school as well, or in other words, to provide a platform for the reinforcement and implementation of the new or updated knowledge. For this purpose, the principals must identify frameworks in which the teacher can continue to develop, enable processes of guidance and mentoring when the change is introduced, develop learning groups, and allocate sufficient time to learning, so that it will constitute a continuation of the professional development and suit what is learned in the frameworks of professional development of teachers for the specific framework in which the in-service training participant works. The display of a personal attitude on the part of the principals towards the participants in in-service training – attention, counsel, and support – greatly strengthen the teachers' feeling for the school organization (Mizell, 2010).

A learning community is a part of the pedagogical flexibility given to the principal. It is possible to identify different communities in the school and in the 'teachers' centers'

that are intended to organize the resources allotted for the topic. In this pattern, the single teachers from different schools in a geographic area are collected together, learn together, and participate in in-service training courses (Robinson, Hohepa, & Lloyd, 2009).

The creation of learning communities and peer learning is one of the main instruments in professional development, in which teaching workers learn from one another. This learning enables empowerment, relevance, peer discourse, reflection, and so on (Wasilk & Hindman, 2011; Sjoer & Meirink, 2016).

The Ministry of Education emphasizes this topic before all the factors that hold professional development courses and obligates the allotment of a defined period of time during the course to the peer learning as both a method and a value. Today there are physical and virtual learning communities. The communities are held in different and diverse compositions, for instance, communities of science teachers who meet regularly for shared professional learning, a community of school principals who learn together management issues, a community composed of supervisors and principals on the level of the district, a professional learning community in the school, and so on. The staff that constitutes a professional learning community in the school can be the entire teachers' room or a subject staff, homeroom staff, interdisciplinary staff, and any other school staff acting to achieve defined goals. The professional learning community can have different and diverse focuses: teaching and learning, curriculum, social issues, involvement of the students in the community, and so on. The composition of the learning community will depend on the topic at the focus of its work (Birenbaum, 2009; Dumitru, 2012).

The school communities of teachers learn together and professionally a wide range of topics, which are chosen by the leading teachers along with the school management. The learning in the communities furthers the depth of the teachers' professional knowledge, develops and improves their abilities, and gradually enters into the classrooms and teachers' rooms. This is a profound perceptual change, which shifts some of the responsibility for professional development to the teachers, and thus challenges the traditional working and thinking patterns existing in the system (Herut, 2018).

The members of the community share a vision and values, share norms, act collaboratively, conduct among themselves a reflective dialogue, collect and analyze data and evidence, draw conclusions, and make changes so as to improve their teaching and the way in which the students learn in their classes (Balenga, Landler-Perdo, & Shachar, 2011). Reflection is one of the important tools in professional development, since it enables the teaching worker to look at herself during her teaching and/or observe the peer teaching (Bokek-Cohen, 2016; Brockett, 2008).

The Department for the Professional Development of Teachers has constructed tracks that teach the workers of teaching-learning use of reflective tools. These instruments may enable the teachers to deepen their knowledge of themselves and to follow up after their behavior in light of the knowledge acquired in courses for professional development, to examine it during activity, to learn from it, and the reverse is also true.

The discourse in the professional community about the experience in the implementation of what is learned and the feedback for the teaching worker for her activity and insights may contribute to the increase of the depth of academic knowledge and implementation, to peer learning, which contribute to one another both on the level of the conceptualization and on the level of the performances. The establishment and development of a learning community in the school lead a process of change in all respects, and it is necessary to take into account the perceptions that exist among teachers and to think how to work with them. In addition, it should be remembered that this is a process that takes time and requires effort, recruitment to the effort, and creation of conditions that will support the teachers in the process (Birenbaum, Kimron, & Shilton, 2011).

Goals of Professional Development

- To form a professional identity for the purpose of the fulfillment of the teaching worker's personal and professional abilities.
- To increase the personal and professional efficacy, so as to promote the achievements required during the implementation of the roles.
- To develop and understand the nature of the professional commitment to the assurance of quality teaching and learning for the students.

- To ensure optimal functioning for the teaching worker as a member of the staff of the educational institution and as a partner in the success of the organization in which she works.
- To promote the personal and professional development of the teaching worker as a person with an educational, social, and value-oriented outlook.
- To improve the teaching worker's abilities to provide an effective solution for students, parents, and partners in the role, to realize the goals and objectives defined in cooperation with her personal needs and the needs of the system.
- To enable the possibility for mobility and progress on the professional scale of ranks.
- To assimilate the policy of the Ministry of Education for the achievement of the required objectives

The program of professional development in Israel is based on the following principles:

- The institutionalization of the tracks of promotion of the teaching workers, through the emphasis on the individual's needs, the school needs, and the school goals, and emphases of the district and the policy of the Ministry of Education.
- The assurance of the intra-role learning process of the teaching worker throughout her professional career.
- The manager of the educational institution bears the overall responsibility for the professional development and leads it according to the policy of the Ministry.
- The outputs of the process of professional development are expressed in the implementation of the learning processes in the class and in the educational institution and in their assimilation.

These principles were intended to develop and improve the teacher's knowledge and skills for the filling of his role so as to promote the students' achievements and functioning. Their goal is to promote the teaching professionalism and to help teachers develop tools and skills that would allow them to meet the objectives that the education

system sets for them. The inculcation of values and skills suitable for the 21st century³ and the promotion of pedagogy that awakens thought, creativity, civic involvement, and criticism create a positive and relevant learning experience. (Department for Professional Development for Teaching Workers Outline of the policy for professional development of teaching workers, Ministry of Education, May 2009).

1.4 Characteristics of Professional Development

A program of professional development is generally undertaken in a formal manner and often as a part of the mandatory government or professional requirements that lead to recompense or professional advancement (Snoek, 2014). Therefore, the trainings for teachers are given by outside experts and not necessarily on the basis of the experiences, difficulties, and challenges that the educating teachers bring (Brooks & Gibson, 2012).

Huber (2010) bases this approach on the school reality of the 21st century that is characterized by the lack of information that is based on theories and does not enable the teachers to undergo a process of learning. This process does not effect a positive change in the teaching practices and does not contribute to the improvement of the students' achievements.

The literature indicates that teachers are not satisfied with their process of professional development as it is held today. Since this process lacks the involvement and participation of the teachers themselves, there is the inefficient use of the time allotted to it and it is not implemented optimally (Bill and Melinda Gates Foundation, 2014). Teachers feel that a traditional approach of professional development does not help them create constructive teaching practices, inquiry-based, identified with learning in the 21st century (Brooks & Gibson, 2012).

As a way to promote the teachers in the field of education, it is recommended to develop leading or master teachers, who will act as leaders of excellence in teaching and

³ 21st century skills are skills that the education system in Israel wants to inculcate in its graduates so that they can integrate optimally in the society and in the work world of the 21st century.

in education. Their role will be the development of the professional ability of their fellow teachers through processes of learning and growth (Margolis, 2012).

Master teachers need to be disciplinary artists, pedagogical artists, with a social educational identity, and with abilities of leadership. The master teachers are constant learners, who create relationships with meaning in the school and maximize opportunities for professional development of the teachers and are responsible to lead to the partnership of all the teachers in the process of the improvement in the school, and obtain responsibility for the process that the teachers undergo (Lieberman & Miller, 2008; Shulman & Ben Peretz, in Michaeli & Somer, 2014). The master teachers serve as a source of expertise in teaching and in disciplinary knowledge and in their ability to develop close personal relationships with teachers and through them to enable and to perform processes of significant learning. These professional and excellent teachers are characterized by the ability to organize their knowledge and use it, to create an optimal climate for learning through interactions in the class, to understand the degree of progress of the students in the studies and in the supply of relevant and useful feedback, to be full of desire for teaching and learning, and to challenge their students with tasks and feeling of responsibility for the learning process (Hattie, 2003; Hattie, 2016).

In addition, these master teachers can serve as coaches, as developers of existing and new staff members, and as leaders in the teaching practices in the school.

The model of professional development in the leading of the teachers is more suitable to the way in which adults learn. It encourages more control and activity of teachers in their process of learning, it leads to more professional learning suited to the teaching profession, it enables greater cooperation between teachers in the framework of the learning process, and it reflects a more effective allotment of resources to the topic of the teachers' professional development (Wood, 2007).

The source of learning of master teachers is characterized by professional development related to specific content, appropriate for the teachers' needs and directed to them closely, focused on the heart of teaching activity and not disconnected from it,

occurring through dialogue that engages in the search for the synthesis and reformulation of concepts and ideas (Margolis & Doring, 2012).

The master teachers create in the schools learning communities that enable the teachers to share in the conversation that pertains to dilemmas they encounter, to discover, and to be involved in it. The public research of the discourse in the framework of the learning community equips the community members with dialogue tools with the potential to further the investigation and observation of dilemmas and to create a change from a situation of static learning to active learning, which leads to the change or adoption of a certain pattern (Jacobs & Yendol-Hoppey, 2010).

Professional development under the leadership of master teachers enables the learners to implement agency in the learning process, or in other words to evince essential mastery over the process. The use of agency in the learning process of teachers is a central and important condition. Agency enables teachers to think anew about their practices, to institutionalize new roles in the class, to develop a system of new expectations from their students, and to teach in a way different from the one they taught in the past (Calvert, 2016). It is expressed in the active participation of teachers in their growth and in the growth of their peers.

A learning approach that encourages agency gives the teachers a respected place in the planning of the learning process, in the shaping of its goals, and in the determination of its contents, in the degree of its suitability to the needs of the learning teachers, and in the occurrence in the school, with the use of internal sources of specialization and knowledge.

The degree of realization of the teachers' agency depends on the internal characteristics of teachers, which primarily refer to their motivation to be involved in growth and in learning, and on the characteristics and conditions for the teachers' professional learning, which mainly addresses the scope of their involvement in the making of the decisions related to the learning process (Calvert, 2016). This involvement may be expressed in the high presence of teachers and principals in teams that make decisions on the topic of teacher professional development. It is also reflected in the possibility of choice

for the teachers in all that pertains to their professional development (Mehta, 2016). In addition, it is necessary to refer to new teachers who enter the system. Furthermore, it is necessary to address new teachers who enter the system and affiliate them to the learning process of their peers. These teachers undergo a change of identity and become active participants in the learning community.

A learning community is a group of people who share a certain concern, a constellation of problems, or an enthusiastic desire regarding a certain issue that increases the depth of knowledge and expertise of its members in the field through continual interaction on a regular basis (Anfara, Caskey, & Carpenter, 2015). A professional learning community is characterized by the formation of values and shared perceptions that pertain to problems and issues at hand, in a clear and consistent focus on the students' learning, ongoing reflexive dialogue that leads to multiple and continuous conversations on the topics of the curriculum (Sjoer & Meirink, 2016).

The learning process occurs in a certain social environment, through group discussion, shared understanding, and inputs and through practical activities that attempt new ideas. The learning derives from action undertaken in relation to another and in connection with it. It creates a change in the culture of the schools in the way in which the teaching is perceived as a public practice given to discussion and observation among peers (Korthagen, 2010).

The characteristics that influence the professional development are as follows: coherence of contents, cooperative learning, ongoing and not one-time learning, active learning, and flexibility.

1. Coherence of the contents. The professional development of teachers needs to be anchored in innovative teaching methods that inculcate tools that enable them to be implemented in actuality in the teaching. The contents include the extension of the variety of methodologies suited to significant learning and the pedagogical issues suited to the 21st century, including the introduction of technological methods that enable their real integration into the teaching work and the development of the

- teachers' skills in the disciplinary field of knowledge (Gorin, 2010; Heishrik & Kfir, 2012).
2. Cooperative learning. The professional development of teachers needs to be cooperative and to entail reciprocal sharing of knowledge. It must focus on communities of teachers who work together and not necessarily on individual teachers. Such learning invites cooperation between the learners, which positively influences the qualities of learning in three dimensions – personal, social, and professional (Kennedy, 2011). Such learning enables the development of language and vision. Teachers learn from one another through the engagement in shared problems and shared work on daily tasks, such as choice of study materials, planning of lessons, shaping of tasks, response to problems, and reference to specific students (Lefstein & Snell, 2011; Van Driel et al., 2012).
 3. Ongoing and not one-time learning. Rich professional development is not a one-time event that passes; rather it lasts for periods of time, is intensive, and thus contributes more to the teachers' professional development (Charteris & Smardon, 2014). The learning needs to be coordinated between the initiatives of the State and the system of beliefs of the teacher so as to assure that it will be relevant. These activities are supposed to occur over time, thus enabling them to be researched thoroughly and to be improved.
 4. Active learning. The most significant learning for teachers occurs when the teachers are a part of the community of practice with fellow teachers who teach in the same place. Professional learning activities need to be based on data, at the center of which is the students' work and how students learn. Active learning needs to occur over time and to enable cycles of development, implementation, and assessment. The content needs to be focused and specific (Knight, 2011). Teachers need to have academic and theoretical knowledge. They must observe successful teaching, learn from it, and experience it. Successful teaching focuses both on the learner and on the learning. They learn in cooperation with other teachers, using the observation of their students and joint conversation with other teachers about the findings of

their observation. The development of teachers in an era of change requires the development of strategies that will help the schools and the teachers be responsible for their students' learning and not the development of policy with the goal of directing and controlling the teachers' work. Teachers' must analyze and engage in reflection of their actions, evaluate the effectiveness of their teaching, and refine and improve their work. They must constantly evaluate what the learners think and understand and following their discoveries change their programs (Desimone, 2009; Nguyen, Fernandez, Karsenti, & Charlin, 2014).

5. Flexibility. Flexibility is the possibility of making decisions and acting independently, in pedagogical and organizational issues according to frameworks and needs, through empowerment to the teaching workers. The frameworks for professional development need to be dynamic and flexible. There must be flexibility of action, flexibility in the learning frameworks, and flexibility during the learning. The teachers plan for themselves original programs and choose the activities for professional development. A teacher chooses for herself the frameworks of professional development, according to her forming personal identity and personality, social, and cognitive needs, and thus she receives recognition of her specialness (Mizell, 2010; Somech & Drach-Zahavy, 2012).

To conclude, the professional development of teachers through master teachers and the development of a learning community in the school enable the effective growth of teachers and the improvement of their teaching practices, when the goal is to improve the quality of the teaching and make a real contribution to the students' learning processes and scholastic and social achievements.

1.5 Influence of the Professional Development of Teachers on the Learners' Achievements

The teacher is a key figure in the assurance of significant learning in the institutions of education. According to the McKinsey Report (2007), "It is impossible to improve the learning without improving the teaching".

In light of the challenges of the 21st century, the teachers and the students face the rapid change influenced by the online and digital environment, and thus the teacher must change her teaching and the students their way of learning. On the one hand, the teacher must develop a professional identity and provide a solution for learning throughout her career, so as to reinforce her professionalism and status. The starting assumption is that significant teaching is teaching that enables significant learning, which includes active, independent, investigative learning with initiative and critical and creative thinking, and all this for the purpose of the improvement of the teaching and the improvement of the students' achievements (Yoon, Duncan, Lee, & Shapley, 2008; Stumpfenhorst, 2012). On the other hand, the student is found in the era of a 'knowledge explosion'. Therefore, the important aspect in education in the 21st century is the inculcation of tools and skills that will enable the identification, filtering, and acquisition of knowledge and the ability to implement it at the proper time and place. In other words, the important parameter in education in the present era lies in the development of processes of learning and thinking, significant learning, and not just the inculcation of knowledge. It is necessary to take into account the student's readiness for adulthood in a modern country and a developed economy (OECD – Pisa Report, 2015).

The McKinsey Report (2007), which examined the characteristics of the schools around the world that achieved the highest scores in the international achievement tests and the policy of the national systems in this field shows, shows that these countries do not rest in all aspects regarding the quality of the teachers and the teaching in the classrooms. The focus of the teacher on the teaching is a necessary condition but not a sufficient one to effect a change in the level of the students' achievements. The teachers need to be aware of the specific weaknesses in their teaching practice, to acquire the understanding of the best teaching practices, and to motivate and to improve constantly through the performance of the practices that accompanied by support of the mentor teacher and the teamwork (Parr & Timperley, 2010).

The teaching profession necessitates expertise and being up-to-date and naturally obligates lifelong learning to help teachers understand educational reforms and assimilate them in the everyday practices in the teaching framework. The learning of teachers is

generally performed through the acquisition of practical knowledge needed for teaching. Effective professional learning is undertaken in the school environment in a variety of ways and methods, for instance, coaching, guidance, peer learning, development of tasks in the team, and lesson study (Coffield, 2013). The learning of teachers is a process of the collaborative inquiry of the practices that are successful and beneficial through experience and innovation in the classroom and construction of shared common knowledge. The content of successful professional development focuses on what students need to learn and on their learning challenges, which are based on the analysis of the differences between the performance of the achievements in actuality and the learning goals and involve the teachers in the identification of their learning and development needs. This process influences the students' learning and achievements (SCALE, 2014).

Darling-Hammond, Hyler, and Gardner (2017) noted elements of effective professional development that indicate a positive relationship between teaching practices and student achievements.

- Content-focused professional development. The teacher knows the curricular contents and focuses on teaching strategies related to these contents in the context of the student's learning.
- Adoption of active learning. The teachers plan and attempt teaching strategies and use authentic products and interactive activities, so as to enable professional learning for the development of learners' achievements.
- Support of cooperation. The teachers create a space for joint work and sharing of practical knowledge and thus create communities that change the teaching culture.
- Use of effective models of practice. The teachers see models of teaching that include planning of lessons, planning of units of learning, examples from students' works, observation of fellow teachers, and analysis of written cases that illustrate the teaching.
- Giving opportunities of coaching and support of experts. The teachers share knowledge of experts according to their needs.
- Giving opportunities for feedback and reflection. The teachers allocate structured time for reflection, receiving feedback, and carrying out changes in the practice

through reflection and accompanying feedback. These instruments enable teachers who learn to shift to a vision of professional practice.

- Continuous activity over time. The learning space enables the teachers enough time to teach, to practice, to implement, and to wonder about practices and strategies that will lead to the promotion of the learners' achievements.

All this is undertaken in a culture in which there is a collective belief of the teaching staff in their shared ability to create a change.

In addition, research studies show that teachers who participate in learning communities share their professional knowledge and focus on the improvement of the teaching. They acquire new knowledge and skills and use knowledge they acquired in in-service training courses to improve their teaching and their leadership. The teachers work with their colleagues, analyze the learning products of their students and their learning strategies, interview and examine the process of their learning, learn from their mistakes, and develop unique pedagogies, such as leading class discussions, ways of assessment of the student's work, and involvement of peers in the learning communities that contribute to the constant improvement in knowledge and skills of teachers and their sense of efficacy to bring their students to achievements both in knowledge and in skills (Dagen & Bean, 2014).

To identify problems, members of the group must share their practice with their colleagues. Teachers who work in a professional community feel that they are supported and develop more positive opinions on the abilities of their students, develop new teaching strategies, and observe an improvement in the students' achievements (Darling-Hammond, Wei, & Johnson, 2009).

Lieberman and Miller (2016) note practices that characterize successful learning communities that have the goal of connecting between the participants' learning and the students' learning. The communities are required not only to find teaching ways but also to attempt to define for themselves an action program that will lead the activity in the community to influence the teaching in the class. This process is vital, since it enables the teachers not only to examine their work in the class but also to look reflectively at their

very process of professional development and to examine whether what is done in the community influences the teaching in the classes and advances the learners' achievements.

Learning communities that place at the center of the analysis the work of the student and information on the student provide opportunities for teachers to develop joint understanding of widespread mistakes and teaching strategies. The power of the focus on the student's data and professional dialogue are expressed in the consistent success of the achievements of the students in the elementary schools. Research studies support the fact that professional development deepens the teachers' content knowledge and the knowledge how to teach the students (Mindich & Lieberman, 2012).

Teachers who exchange knowledge, ideas, and teaching practices with their peers report greater satisfaction and self-efficacy and better student-teacher relations. All these are factors related to greater success of students, ensure shared standards in the evaluation of the students' progress, and may predict the level of achievements (OECD, 2014, TALIS Results).

In addition, the professional teacher is expected to be current in knowledge related to socio-cultural, psychological, philosophical, historical, and political aspects that connect to the influence on the education system. The integration of these aspects in the processes of professional development is essential to the increase of their understanding and even involvement in what is done in the world of students and communities with which they have a close professional relationship, as teachers-educators and leaders (McKinsey Report, 2007).

Over recent years, an accounting regarding the students' achievements in the context of the teachers' professional development is required. The rationale at the basis is that a teacher of high quality in terms of knowledge and professional abilities, with professional development throughout her life, influences at a higher level the students' achievements (Robinson, Hohepa, & Lloyd, 2009).

The variables such as the quality of the teacher in terms of knowledge and professional abilities as well as the teacher's experience has impact on the students'

achievements and in essence they are the main factors, from the entirety of variables related to the school, which explain the students' achievements (Borko, Jacobs, & Koellner, 2010). For the learning of teachers to lead to the improvement of their teaching and the increase of the students' achievements in different areas, including social and emotional areas, it must focus on and frequently update in the learning how to learn and how to teach.

Neuman and Wright (2010) describe the professional development as a dynamic process that requires of the teachers to be reflective and open to the improvement of their learning experience and to acquire new skills such as modeling, guidance, coaching by an expert, observations of peers, and active involvement. The influence on the learners' achievements depends on the organizational climate of the school that promotes activity and reflective thinking in the communities of teachers. To encourage this process, it is necessary to inculcate in the teacher tools and skills of assessment for the identification of what the students know and can do to improve their achievements and what they need to learn themselves to help their students.

Therefore, teachers need a variety of ways for the evaluation of their students' progress, beyond the standard means of evaluation, such as interviews with students about their learning, methodical analysis of the students' work, and observations in the classroom. Thus, the teacher communities integrate alternative processes of assessment (Hairon, 2016).

The objectives of the teaching, the objectives of the evaluation, and the objectives of the studies must correspond, so that the results of the evaluation will shape and promote the teaching and the learning. In the post-modern era in which we live, it is necessary to cultivate the learner with self-direction. Hence, the teacher in this era becomes an instructor and partner who provides opportunities for learning that occurs as an internal process of the learner. The teacher should see the learners' needs and help the learners identify them. The teacher's role is to help the students implement self-reflection of the work and to diagnose their current situation, relative to the goals they set for themselves. Hence, one of the characteristics of alternative assessment is the involvement of the students in the assessment process in all its stages through the clarification of the goals of the assessment,

discussion about the methods of assessment and what can be learned from each one of them, composition of rubrics according to which the performance will be assessed, and determination of the type of evidence to be used for assessment (William, 2011, in Mooney, 2014).

Research studies show that in essence the processes of teaching and education in the classroom are the only ones that may increase the achievements and profits that students derive from the school. What is missing in many reforms that schools implement is the recognition that teachers of great skill must continue to learn to improve their practice. To improve, the teachers must research their activity, know to plan and perform what is required of them in everyday life, and determine for themselves standards that will advance the entire profession (Lieberman & Miller, 2016).

In addition, it is necessary to address the integration of computerized online instruments in the teaching system, which forces the teachers to cope with a totally different teaching pedagogy that was not known by them beforehand. In the online computerized environments, both the teachers and the learners take upon themselves new roles, which are different from those performed in the traditional class (Ertmer & Ottenbreit-Leftwich, 2010).

The technological changes that characterize our period led to changes in the frontal-traditional teaching and in the manner of perception of the teacher as a main figure in charge of the teaching and learning processes in the class. As aforementioned, the computerized online teaching environments adopt the constructivist theory for learning, which believes that learning is an active process of the building of knowledge and not the acquisition of knowledge. Hence, the theory places the learner at the center of the learning process and encourages his development as an independent learner and greatly influences the learners' achievements (Adesote & Fatoki, 2013). However, it should not be concluded that following these changes the teacher 'loses' centrality in the processes of teaching but her role is re-interpreted and has diverse characteristics (Blau & Eshet, 2014). One of the ways to cope with the changes that have occurred in the teacher's position is to promote the transition of the teacher from the status of a 'conveyor of knowledge', found at the

center of the process of teaching and learning, to an instructor, who mediates, directs, supports, counsels, invites situations of learning, and provides for the students a ‘scaffolding’ for learning that is a new way to promote the learner (Blau & Eshet, 2014).

To conclude, it appears that the teacher needs to dedicate considerable resources, primarily time, to her professional development and must master a variety of existing information bases and increase her knowledge in her field of expertise but also acquire knowledge in areas that are not related to her field of expertise so as to help the learner. The mastery of a variety of information bases will require the teacher to be a life-long learner, who is updated in new methods and learning contents and this so as to improve the learning and intellectually stimulate the learners (Stumpfenhorst, 2012).

Summary

This chapter described how in the 21st century the schools are required to act as learning organizations and to allocate resources to the professional development of the human capital employed in them so as to improve abilities and outcomes, which will be expressed also in the students’ achievements. The teachers’ work is performed individually in the classroom, but in a participative professional culture their personal and professional development occurs by taking part in a learning community that nurtures them and is nurtured by them in parallel.

The combination between teachers who simultaneously teach, learn, and build knowledge and a professional community that provides them with a supportive development environment creates high mutual commitment, encourages mastery and activity among the teachers, and enables them to focused learning tailored to the true needs in the field.

A professional learning community is a framework that provides to the teachers tools for renewed thinking and invites freedom of thought. It enables them to adopt new practices and teaching approaches in the spirit of the time, from an experience of involvement and activity.

The next chapter will focus on the nature and characteristics of the professional learning community and will describe its contribution and the challenges entailed by managing and establishing it.

Chapter II: Professional Learning Community: Concept and Meaning for the Contemporary School

2.1 What Is a Community?

In the 20th century, theory developed for the term ‘community’, which maintains that the community is a social unit with unique characteristics that enable it to constitute a main institution in the coping with the social-cultural challenges that society faces. The community has the ability to constitute a new platform for the reinforcement of the social fabric and the rehabilitation of the person’s faith in his ability to take real responsibility for his life, his environment, and his future in general. The community may be an infrastructure for the growth of new social solidarity. Therefore, the reinforcement and establishment of the components of the community as a main framework for belonging and social involvement constitute an existential necessity in society (Grossman et al., 2001).

The definition of the concept of ‘community’ is characterized by lack of unity and lack of clarity. The multiplicity of perceptions, which sometimes contradict one another, indicates the evasive nature of the concept. On the one hand, the concept of community is linked to the different religions, the variety of cultures, and the different philosophical outlooks to the description of a positive aspect of life together and addresses the description of the quality of spiritual, cultural, and interpersonal life (Grossman et al., 2001). However, on the other hand, the concept does not have any formal dimension. The community is not a formal association, it is not a part of the system of local or national government, it is not a legal entity, and it does not have any legal status (Ben Yosef, 2002). Thus, the use of it ranges from the description of a subjective experience of interpersonal relations to an objective description of human organization (Checkoway, 1995).

The use of the term ‘community’ is intended to describe certain social structures, for instance, the community as a special type of association between the family and country or as a measure that expresses the quality of relationships between individuals who are characterized by intimacy, emotional depth, social uniformity, and continuity.

The different definitions in the literature assume that a community is a public of people with shared interest. The difference between the definitions is the matter of what is the shared interest that makes a public or a collection of people into a cohesive community (Checkoway, 1995; Warnesky & Shachuri, 1999; Yahav, 1985).

One of the most prominent distinctions in the literature is the distinction between the focus on the place and the focus on the characterization of the relationships as defining the uniqueness of the community (Smith & Lynch, 2004).

- Community as a place. This is distinct in the local geographic aspect, according to mostly shared territory (city, village). The community is perceived as a collection of organizations and people that hold reciprocal relationships in a defined geographic region (Brik, 1987; Bahem, 1997). For the territorial communities, the presence of a group and the identity with a territory is an essential condition but not sufficient for the definition of a community.

Homan (1999) adds additional dimensions. A community is a number of people who share a region of residence, beliefs, interests, activities, or other issues, who define what is common among them. An effective community action will facilitate their better personal and common development.

- Community as a system of relationships. This addresses the non-territorial dimensions. It focuses the uniqueness of the community on the quality of the relationships between the individuals and/or the groups. These definitions address the community as a group that establishes its uniqueness on components that do not depend on territory and derive from characteristics or elements shared by its members (Gilchrist, 2000). For instance, a community of identification that is characterized by partnership about a characteristic of belonging (Bahem, 1997), a community as a collective based on a shared cultural ideological component, such as the kibbutz⁴ (Bahem, 1997; Rubin & Rubin, 2001), a virtual community that addresses the community dimensions created between individuals through cross-

⁴ A kibbutz is a collective community in Israel that traditionally had a communal lifestyle.

border computerized communication of place and group belonging and enabling a relationship at different levels around diverse dimensions of reasons and characteristics simultaneously (Mesch & Levanon, 2003).

The reference to the different types of communities defined through types of relationships highlights and raises central questions pertaining to the distinction between a group and community. The sociologist Tonnies (1887) based the distinction between society and a community on the basis of different types of relationships.

- **Society:** Associations that are secondary in their nature and that were created to achieve a defined goal. The relations between the group members are specific and were intended to realize the goal for which they gathered together. The relations in this framework have an individual and not a group orientation.
- **Community:** Characterized by primary relations. Most of the members know one another and have close relationships, face to face, relationships that continue and are established. Over time among the members reciprocal commitment and a high level of solidarity develop. Tonnies (1887) noted that the community, in contrast to a society, is a framework that enables the individuals to develop intimate relationships, commitment, and loyalty in a stable social structure that is limited in its scope.

According to Tonnies (1887), these types of associations constitute an expression for the different voluntary motives of the individual:

- **Free arbitrary will.** Addresses the free desire that chooses arbitrarily the goals and strives for them in a conscious and purposive manner. This desire is suited by the association of broad organizational structures.
- **Essential natural desire.** Characterizes the person in his nature and includes the reference to the primary goals and original needs. This is the desire that addresses the commitment and behavior among people. This desire suits community social association.

Buber (1947) extends the definition proposed by Tonnies (1887) and maintains that in contrast to the collective, in which the individuals act side by side, the community is a

group – an ‘association of life’ – in which individuals direct towards one another and are committed to one another, not only in spirit or emotion but also in obligating matters such as shared land, joint work, shared lifestyle, and shared faith.

Habermas (1984) extends Buber’s definition, arguing that the community is more than only an association. This is a unit with social cohesion in which the individuals are members. The group is not artificial or instrumental but is based on main values.

Dewey (1916) holds that the cause of the uniqueness of the community relationships is that they are based on shared needs translated to reciprocal relationships that are supposed to fulfill these needs. This relationship, according to Dewey, is expressed in the verbal meaning of the following terms: common community communication.

People live in a community because of the things they hold in common. The negotiations among them are the way in which they reach commonality in things. The necessary thing for the sharing of all the individuals, for them to constitute a community, is a shared basis of goals, beliefs, aspirations, knowledge – shared understanding or ‘unity of hearts’ (Dewey, 1916).

On the basis of Buber and Dewey, Grote (1989) defines the community as a quality of social life characterized by intimacy, presence, and true and profound reciprocity that yields feelings of belonging, a sense of rootedness, identity, and meaning for the individual. This is a social conversation that has a sense of membership and partnership. Where people are connected to others in relationships based on their shared values, commitment, beliefs, and an invisible relationship of affection and shared life – there is a community (Grote, 1989).

The communitarian perception that developed during the 1980s and 1990s called for the renewal of the community infrastructures as a challenge to life in capitalist individualistic Western society that is based on competition, contracts, self-interest, and personal concern and the unrestrained fulfillment of self-interest, without the ability of the social frameworks to create a shared life, intimate relations, and close relationships. This perception sought to create an alternative through the creation of a connection between the

dimensions of individualism and social commitment, freedom with collective responsibility, support, and cultivation of the community and concern for the general will (Etzioni, 1995, 1998; Taylor, 1992).

At the center of the perception is the challenge of building a community with moral dimensions that reflect the basic human needs of all its members as social creatures. Its members fulfill collective and human values of reciprocity and solidarity. This is a group of individuals who depend on one another in social relationships characterized by reciprocity. They take part together in discussions and processes of making decisions and share common practices through which the group members define their community and are supported by it (Bellah et al., 1998).

In contrast to the community based on agreement on main values, the good community, the community is the one in which there is argument, and even conflict, on the meaning of the shared values and certainly their normative and behavioral meanings in everyday life. A community is not the space of quiet consensus but the space in which the consensus is challenged and changing, sometimes in a gradual manner, sometimes in a revolutionary manner (Bellah et al., 1998).

The education system addresses the cultivation of the community assets and addresses the field of action as a way and means for the creation of a robust community over time. The robustness of the community depends on the ability of the education system to shape the image of the generation of tomorrow and to ensure its integration into the community. Through this process of the building of the community, the community has the ability to develop a vision and to engage in the construction of an educational vision and engage in pedagogy. Therefore, the schools are communities with central importance.

Of all the different definitions in the literature for the community, this research study addresses professional learning and seeks to examine the knowledge and practices so as to improve in professional terms in teaching.

2.2 What Are Professional Learning Communities?

Researchers of education and shapers of policy in the field of teaching see a need to improve the quality of teaching and to provide opportunities for professional development for teachers, the goal of which is to facilitate the increased depth of knowledge and improvement of the teachers' pedagogical skills (Borko, 2004).

Consequently, the recognition arose of the need to integrate theoretical knowledge about the teaching in the different fields of knowledge with the cumulative practical experience of teachers who engage in this in their professional lives and throughout the world communities of teachers are created for shared learning and the creation of pedagogical knowledge and teaching practices, the most of which are guided by experienced teachers and experts in teaching the subject in which they specialized (Farnsworth, Kleanthous, & Wenger-Trayner, 2016).

In addition, it is possible to note that the dynamic pace of life requires of the schools to adjust to a rapidly changing reality. The schools need to be aware of the environment and become updated in the many innovations.

One of the topics raised in recent years, so as to help the teachers adjust to a dynamic reality, is a professional learning community. The professional learning community is in essence a group of educators who works in cooperation so as to improve the achievements of all the learners in the school (William, 2013).

The schools that act as a professional learning community develop processes, strategies, and structures for cooperative learning, through the adjustment of dynamism and changes in the situations that occur under uncertainty (Admiraal, Lockhorst, & van der Pol, 2012).

Accordingly, a professional community starts from the adjustment of the process to the learner and performs a process of the processing of the information that improves the organization's potential abilities, through the adjustment to the needs of the environment. This learning process, as a professional learning community, characterizes

clear goals and organizational learning strategies, which encourage openness, trust, initiative, and experience (Khoo & Cowie, 2010).

A professional learning community is a group of professionals who examine together their knowledge and practices and discuss them with the goal of improving in professional terms (Birenbaum, 2009). Teachers in a professional learning community meet regularly, research the relationship between the practice and their students' learning products, analyze the processes of teaching and learning, draw conclusions, and make changes so as to improve their teaching and their students' learning (Balenga, Landler-Perdo, & Shachar, 2011).

The assumption that directs the activity of a heterogeneous group as a community of learners is that each one of its members has unique knowledge and unique insights that can contribute to others and without these contributions from others the individual will learn less. The equal relations between experts at different levels and from different areas are the ideological foundation stones of the community of learners: a variety of knowledge sources and viewpoints enriches everyone, even the most senior and skilled experts in the community.

The professional learning community can develop in a hierarchical manner from the systemic-administrative level and below to the level of the teachers (top-to-bottom) or from bottom-to-top. In top-to-bottom development, the initiative for the creation of the community is that of the education system and the policy makers, and they follow up after its development. In this case, experts and mediators from the outside are involved and help in the formation of the community. Every rank works as a team and constitutes an action community. The aspiration is that the communities will continue to work without the help of the outside factors.

Learning in the community may increase the intellectual power of the collective. The participants in the community form into a team of shared thinking, planning, and doing.

The goal of the learning community is the professional development of all the participants in it: novice and senior teachers, teachers of teachers, and students of teaching. For such a community to function effectively, the participants in it must act out of a feeling of partnership and from an atmosphere of cooperation. The community members must feel the value of the community to their professional development in every stage of its activities (Kaney, 2006).

Kaney (2006) defines the community of learners as a community whose participants are different from one another, when it is autonomous and possessed of self-organization. The community members are responsible for their functioning in the process of the acquisition of knowledge and its production as a product. The person is a participant involved in processes that occur in the community of learners and in addition is a reflective observer who is aware of his activity and performs thinking of it. The accumulated knowledge is shared by all the participating members. The learning in the community of learners is perceived as a process of interactive structuring, in which the learners, adults and young people, create new insights, through a constant dialogue with themselves and with others. The community of learners offers its members support in the process of their coping with challenges and with changes in their immediate work environment and makes the learning into 'lifelong learning', in practice.

2.3 Characteristics of Professional Learning Communities

The goal of the learning communities is to promote the collective knowledge of all the members in the community through the support of the growth of the personal knowledge of all the members. They become partners in the community of learners in which each one has responsibility to promote the learning.

Dumitru (2012) presents characteristics of meaningful learning communities that should be addressed in the building of a community, such as structured and unstructured communities. A structured community is characterized by a leader, an initiator, a mediator, and participants. In some of them, there are defined roles for every participant and pre-defined ways of communication. Communities are defined according to the period of time, or in other words, are characterized by continuous activity without a future end dates. Every

community must have a regular place for meetings, and the composition of every community includes people from different areas of specialization and different levels of expertise and with different experience. Every community has a defined goal, such as a task that should be performed, or those that converge according to the changing requirements and circumstances. Certain communities assemble for discussion of scientific and academic issues and some assemble to hold a conversation on everyday issues. The environment and range of activity of the learning communities can occur online, in the virtual space, or in a face-to-face meeting. Some combine between both manners. Dumitru (2012) notes that a learning community does not necessarily realize all these characteristics.

In addition, the research literature indicates main characteristics of professional learning communities.

1. Reflective Dialogue

Effective professional learning of teachers includes components of reflection on the practice, investigation of ways of teaching, and constant self-examination. The expertise of the teachers is characterized by the ability to conceptualize the teaching work and to examine the practice from a critical perspective. These reflective abilities develop from the in-depth observation of the practice of the teaching and the learning that it enables.

The reflection is an important tool through which the learner uses thinking and the organization of the contents, addresses the target audience and its comments, and in contrast the rest of the community members learn and enrich their knowledge on this topic, can respond and in parallel learn from mistakes. Through a reflective process, teachers improve reciprocally the learning of one another and the learning of their students and thus build for themselves a persevering constellation for improvement (Earley & Portitt, 2010; Thoonen et al., 2012).

2. Research of Practice – Feedback

The professional processes of learning of the teachers, which focus on the relationships between specific teaching practices and the students' learning and

achievements, improve the students' learning and achievements. In every pedagogical conversation of teachers, the focus needs to be the students' learning and the relationship between the teachers' teaching and the students' learning. The shift of the focus from the teaching to the learning means that it is not enough that the teachers will teach; it is necessary for the students to learn. Therefore, it is important that the teachers will observe their work, analyze their performances and those of the students in actuality, and engage in continuous feedback so as to develop and implement more effective teaching methods, think about new practices in their specific context, and share their knowledge and personal experience (Lomos et al., 2011; Ghousseini & Sleep, 2011).

An effective professional learning community will develop mixed practices in constant inquiry and reflection that encourage the setting of question marks regarding the teaching and support interventions aimed at the promotion of the students (Crawford, 2012).

3. Relations of Trust and Norms of Sharing

Cooperation is a key trait of an effective professional learning community. A professional learning community where there is high trust and reciprocal and professional respect produces a safe space that enables the teacher to learn and develop professionally. It serves as an emotional and professional 'safety network' in experiences that are not successful.

There is significant cooperation when the teachers develop skills of listening, respect the different attitudes, build reciprocal trust, cultivate the others, and serve as a personal example with integrity. In other words, teachers who are members in the professional learning communities reveal their ways of teaching and are prepared to cope with different opinions and to attempt other approaches and teaching methods. They talk about what is done in the classroom and share with their peers their teaching processes in the class and their students' learning processes. In essence, they share together what is traditionally perceived as personal (Fullan & Hargreaves, 2016; Ghousseini & Sleep, 2011; Nehring & Fitzimons, 2011; Stanley, 2011).

Relations of trust and sharing the goal of the learning and professional development are what make the difference between observations in the lessons as a means of supervision and control and observations as a means of learning and development (Graham & Ferriter, 2010).

4. Data-Based Learning and Assessment

Professional processes of learning of teachers are optimal processes when they are based on a variety of data of different types and when there is assessment that examines the results in the comparison to the objectives.

The shared goal addresses the teachers' learning in agreement with the operative actions in the school. The data serve as a source for the examination of the teaching for the construction of a culture of assessment-learning as a basis for reflection that the teachers hold in a professional learning community for the purpose of the examination and evaluation of the changes that they introduce into their teaching practices. The evaluation data provide a basis both for the setting of objectives before the entry into the process of the improvement of the learning and the teaching and during the process itself – to obtain a picture of the situation that indicates to the staff if it is on the right way and if the objectives are being fulfilled and what needs to be changed on the way. For the purpose of all these, sophisticated assessment skills are required, beyond the standard tests: methodical analysis of the students' works, observations in the lessons, interviews, and so on, as well as skills of reading, understanding, and interpreting data (Fisher & Hamer, 2010; Leahy & William, 2012).

5. Collective Focus on the Students' Learning as an Indicator of the Reciprocal Commitment of Teachers to their Students' Success

Learning communities that put at the center of the analysis the work of the student and information on the student provide opportunities for teachers to develop a shared understanding of common mistakes and teaching strategies. The power of the focus on the student's data and a professional dialogue is expressed in the consistent success of the students' achievements in the elementary schools. Analysis of the students' work deepens

the content knowledge of the teachers and the knowledge how to teach it to the students. It helps the teachers understand how students learn specific content, provide active opportunities for practical learning, and helps the teachers acquire new knowledge and implement it, from the teachers' commitment to their students' success (Bar-Yakoov & Tubin, 2014; Leahy & William, 2012).

6. Structured Processes and Regular Mechanisms for Teamwork

The setting of the teamwork is the basis for the creation of permanence and stability, without which significant professional learning is not possible. The setting gives stability and security and conveys seriousness and commitment. Such a setting includes the structuring of the frequency and length of the sessions, annual planning, and planning of each and every session. Consistency and stability constitute the platform that enables significant learning.

The leaders are responsible to organize and institutionalize consistency and stability for teamwork, to ensure that the professional learning frameworks are well managed and organized, and to ensure that there are the conditions required for the involvement in the learning and development processes (Hargreaves, 2013; Lom & Sullenger, 2011; Schechter, 2010).

2.4 Learning Community in the Social-Cultural Aspect

The learning communities engage in knowledge, but the main shared experience in the learning communities in the social-cultural aspect is the creation of a life of meaning for the participants and the development of an identity that enables a feeling of satisfaction and humaneness (Wenger, 2007). Human knowledge is social-cultural knowledge, and the person is a social cultural creature, one who acquires the cultural instruments through imitation in the mentoring process.

Wenger (2007) defines a learning community as “a group of people who share an interest or desire for something and who learn how to do it in the best way through preservation of a regular relationship between their members”. Wenger (1998) proposes a

social theory on learning, the goal of which is to create a broad conceptual framework that is based on a consistent continuum of principles, rules, and recommendations for the understanding and enabling of the learning process. According to Wenger (1998), the meaningful elements of the learning process are based on four arguments:

1. We are social creatures. This constitutes a main aspect in the learning process.
2. Knowledge is an issue of skills of assessment relative to different activities.
3. Knowledge reflects active awakening and participation in the advancement of activities.
4. Meaning is the ability to experience the world and fit into it in a way with value.

These elements are expressed in learning as social participation. Wenger (1998) addresses the term ‘participation’ not only as a part of the integration of people in certain activities but also as a more comprehensive process of people who are active in the practices of social communities and the construction of identities relative to these communities. The perception regarding the learning is based on reflective processes about the discourse in social terms. The process of learning as “participation” occurs through involvement of the community people in the activities and interactions. This process creates the social structure in the community, while emphasizing social systems of the distribution of shared resources, according to which they organize and coordinate their actions, the reciprocal relations between them, and their interpretation (Wenger, 2007).

Wenger (1998) defined these communities as “communities of practice”, which indicate the social theory on the learning process. Communities of this type describe a form of belonging. They shape not only “what we do” but also “who we are” and in addition the way in which we interpret “what we are doing”.

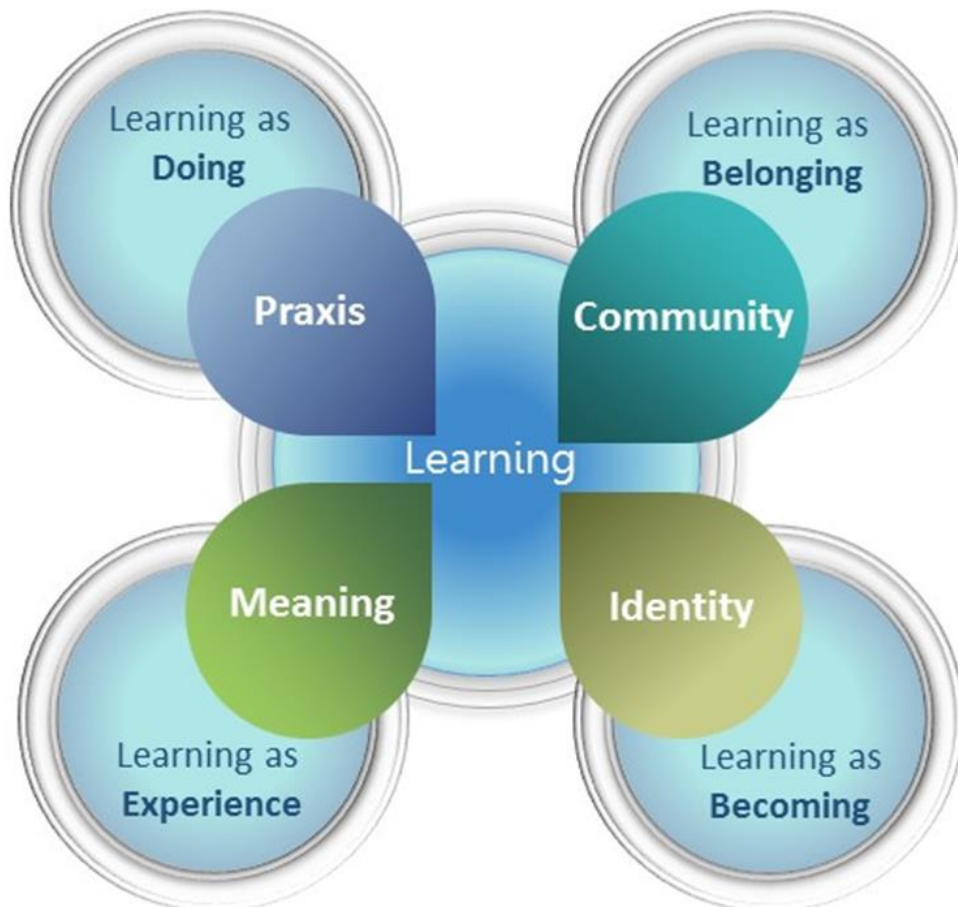
Communities of practice are an integral part of life. They have the character of innovation and the character of renewed acquaintanceship with the aim of understanding the learning process and supporting it.

This theory is based on elements that connect closely to one another and define one another in a reciprocal manner (Wenger, 1998, 2007):

- **Meaning.** Our ability as an individual and a collective to experience our lives and our world.
- **Praxis.** The resources, frameworks, and shared historical and social aspects, which support the reciprocal involvement in activity.
- **Community.** The social configurations in which the activity and participation in the community are expressed.
- **Identity.** The way in which the learning process changes “our nature” in the context of the communities to which we belong.

Figure Number 1

Communities of Praxis – Components of Social Theory on the Learning Process



Wenger (2007) notes that the learning community includes social constructs found in the field of the involvement of the profession in which they teach and the learning may be the reason for which the community formed. In the community, the aspiration is to cause learning, to control it, to direct it, and to accelerate it so that the perspective on the learning process will be more meaningful. The learning process is enrooted and anchored in the social order and creates social interactions. They focus on interpersonal relationships that have imitation and example and consequently on the study of the cognitive processes that constitute the source of the learning process. They are useful to the understanding of the mechanisms that process information in a precise manner, through which the social interaction influences the behavior.

The learning becomes even more meaningful when the social activity in the community constitutes an inseparable part of the learning. Theoretical learning is alongside activity that includes reflective discourse, discussion of experiences from the activity in the community, and connection between the experiences and theoretical concepts and ideas. Such learning, which combines between activity and peer support, increases the learners' achievements and deepens their professional understanding (NSDL, 2012).

The Experiential Learning Circle in the Professional Community

The learning community creates a change in the teachers' professional learning. They act from principles of investigation and collaboration, so as to improve the quality of the teaching and the learning. However, to implement these principles, it is necessary to recruit the teachers who are partners in the community.

One of the prominent characteristics of learning communities is that they see the partnership with their peers as a factor that motivates and promotes the learning. In other words, the very encounter and dialogue entwined in their joint work enable the friends to support the learning of one another through reflection and feedback and because of the knowledge, skills, and unique perspectives of the different community members. The community members engage together in the examination of the work processes, document the practice, and analyze it with the goal of improving it (Ghousseini & Sleep, 2011).

In this way, these communities link in practice between the learning undertaken in the group and the way in which the teachers teach in their classrooms. This is a transition from an unorganized perception of professional learning to a perception based on the use of representations from the teachers' practice, such as experiential learning as a means of the development of their understanding regarding the processes of teaching and with the aim of improving them.

This process is based on the constructivist teaching approach. The goal of the learning is to change previous perceptions and knowledge and in parallel to acquire new knowledge. The process is accomplished in a social situation with the support and assistance of the teacher and the group.

The learning cycle of Kolb (1984) is a main component in the theory of experiential learning. Experiential learning is a pedagogical approach that promotes a direct relationship of the students with the reality in which they learn (Dewey, 1938). The theory of experiential learning engages in the nature of the cognitive processes that characterize learning. Kolb (1984) holds that learning is an abstract process in which the construction of concepts and perceptions occurs and they are implemented flexibly in a wide range of new situations. Learning is a process in which knowledge is created using the transformation of experience. According to this theory, it is necessary to offer the learners a direct and experiential encounter with a meaningful phenomenon in their lives, the investigation of which obligates sensory and cognitive experience, reflective observation, processes of conceptualization, and the implementation and practice in new contexts (Kolb, 1984).

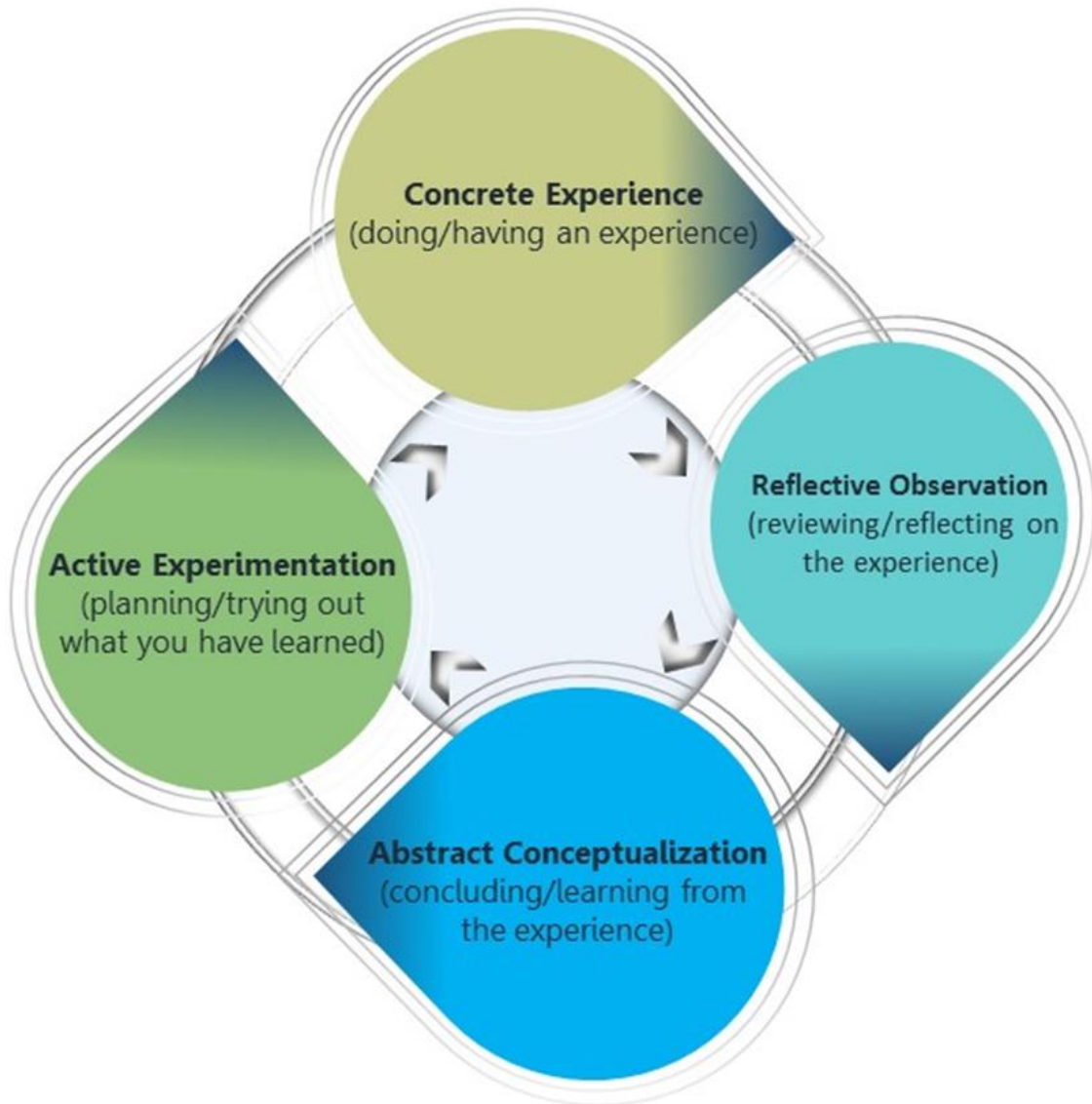
The fundamental assumption upon which the learning cycle of Kolb (1984) is based is that concrete and experiential experience is not enough to bring about meaningful learning. It is essential to hold reflection on the experience so as to perform generalizations and to formulate concepts that it will be possible to implement in a new situation. The new learning must meet the test of new situations. The learners must link between theory and practice through actions of planning and doing, through the use of reflective processes.

In this type of learning cycle, the teachers' roles change during the lesson with the advance in the cycle. At the beginning of the lesson, the learners' needs are satisfied through the encounter with an experiential phenomenon, construction of motivation, and development of awareness of the need for learning. Then, the learners are helped to perform conceptualization, and the learners are offered new situations that necessitate active examination that is based on the perceptions understood in the previous stage. With the end of the circle of learning, the students are given possibilities for discovery and self-expression through experiencing and creating.

In the learning cycle of Kolb ,1984 there are four stages that develop from one another, as follows:

1. Concrete experience. The students are offered experience with a new situation or a familiar situation that requires further investigation and interpretation.
2. Reflective observation. The students look reflectively on the situation and examine it.
3. Abstract conceptualization. The students are required to perform processes of reflection and information processing that lead to the building of new ideas, the change of existing perceptions, the building of generalizations, and the broadening of the meaning of concepts.
4. Active experimentation. The learners examine/attempt new situations in the world that surrounds them using the new insights they acquired.

Figure Number 2
The Learning Cycle of Kolb (1984)



According to Kolb (1984), meaningful learning occurs when the learners undergo cognitive processes through these four stages (see the above figure). Concrete experience,

observation and reflection on the experience, building of abstract concepts (analysis and synthesis) and generalizations (drawing conclusions through induction), and last the use of knowledge and new perceptions to examine and attempt new situations (drawing conclusions through deduction) – all these processes are combined in an integrative manner so that each one of the stages is supported by the previous one and nurtures another one. It is possible to begin the cycle at any one of the stages in the cycle and to continue in the continuum of the stages during the learning. However, so that meaningful learning will occur, it is necessary to allow the learners to implement all four stages of the model. The learning processes that occur from the stage of concrete experience until the stage of reflective observation emphasize the experiential-emotional connection of the person to the task. The processes of learning that occur from the stage of the active examination until the stage of the reflective observation emphasize the integration of the implementation and experience together (Kolb & Kolb, 2005).

The model of the learning cycle in the professional community creates a challenging learning environment with positive implications. It improves the learners' wellbeing and self-awareness and increases their motivation and involvement. It develops interpersonal relationships and improves the teamwork skills and the coping with situations of complexity and situations of uncertainty. It requires the leaving of the comfort zones and requires cooperation, discussion, self-reflection, and involvement in the community (Paniagua & Istance, 2018).

2.5 Models of Professional Learning Communities

Learning communities are integrated in the school culture. There are three types of school communities that influence differently the participants in the community. In a weak community, the teacher works alone and individually, the teacher's teaching methods are traditional, and the student also works alone. There is no discussion on the learning of teachers or students, and there are no observations of the peers of the lessons. In this type of community there is a discussion on the students' achievements, but there is no trend to change the ways of teaching that were proved to be ineffective. In addition, it is possible to identify a strong traditional community in which the teachers feel responsible for the

students' achievements, not from a feeling of inner missions but because of the pressure of the various interested parties. Another community is a professional learning community that acts over time and succeeds in bringing about the improvement in the participants' achievements. For the most part, it is characterized by norms, vision, and values shared by all the members of the community. The teachers collect and analyze data and examine evidence regarding connections between the practice and the learning products of their students, draw conclusions according to the findings, and make changes so as to improve their teaching and the learning of the students in their classes. The participants display great dedication and honest caring towards the students and feel collective responsibility for their achievements. They also share with the rest of the participants experiences and feelings that in the traditional approach were considered personal, such as goals they set for themselves, strategies, aids, and teaching methods. (Dufour et al., 2006, in Blanga, Landler-Pardo, & Shachar, 2011).

Alongside the types of communities, there are learning communities that serve as frameworks for the professional development of teachers. There are a number of models of learning communities.

1. Continuing School Learning Community

A professional school learning community directs the learning itself, to differentiate from the widely found professional development programs, in which the outside agents of change decide for the teachers what the professional development they require is, without its positioning in the unique school context (Birenbaum, 2009). Continuous and sustainable learning of the teachers and the school reflects the school's internal ability to achieve the goal – to improve the students' learning. This type of learning includes all the involved factors in the community so that the schools will adjust to their changing world and will offer their students the best opportunities for development. The community holds regular learning, methodical, and ongoing learning mechanisms, inquiry based, whose fruits are assimilated in the routine of everyday activity (Kurland, Peretz, & Hertz Lazarowitz, 2010).

2. Topic-Focused Professional Learning Community

The main objective of the topic-focused community is to promote the content knowledge and pedagogical abilities so as to contribute to the teachers' professional development and thus to promote the teachers' professional development and hence to promote the students' learning. A topic-focused professional learning community can be mixed or disciplinary and can act in different frameworks: in the school or in a framework outside of the school (Weiss & Pasley, 2006, in Blanga, Landler-Pardo, & Shachar, 2011).

3. Mixed Community

The mixed community is a community in which the member teachers are from a variety of areas of knowledge that teach a certain topic. This community acts in many cases in the school. The teachers learn a certain topic that is relevant to all the teachers and that reflects the different contexts from which the teachers come. The teachers need to be convinced that the learned topic has value and contribution for their work. The learning is undertaken for the most part with the help of outside experts, in the framework of a course, in-service training course, seminar, and so on (Greene, 2007; Shachar, Gavin, & Sharan, 2009).

4. Disciplinary Community

The disciplinary community is the community of teachers that teaches the same knowledge field. The emphasis in this type of community is on the learning of the content, and its goal is to raise the level of knowledge and skills of the teachers in the field of their specialization.

If the community exists in the school framework, then these are teachers from the school who engage in the professionalization in their field of specialization. The professional staff meetings and conversations conducted among members of the professional staff constitute an example of frameworks of community from this type.

In the disciplinary community teachers from different schools are partners, specializing in the same discipline. One of the main challenges in the topic-focused mixed communities is to create inspiration among the teachers and to organize activities that will reflect both the learned topic and their approach to the topic.

In disciplinary communities there are additional difficulties, such as competition between teachers from the same topic, and discretion regarding the school where they work, two factors that may delay the creation of relations of trust and cooperation among the teachers (DuFour et al., 2006; Ofarim, 2014).

5. Communities Focused on the Studies of Technology

The students use technologies for the purpose of social interactions, sharing of information, and learning. Therefore, the teachers must be experts in the field as well.

Hence, mixed school communities of teachers arose. Their primary goal was to develop the knowledge and technological skills of the teachers, for the purpose of the improvement of the teaching and the learning. The integration of information and communication technology (ICT) necessitates the focus of the learning community in technological skills, in the creation of learning programs that incorporate technology, and in the planning of suitable learning materials (Magen-Nagar, Rotem, Inbal-Shamir, & Dayan, 2014; Pedagogical Administration, 2015).

6. Online Learning Communities

Teachers and educators with shared interest can establish or connect to an existing virtual community on the topic or field that interests them. The community operates entirely online, and its members can join it and leave it as they please. The partners in the online community can be from a variety of cultures and countries. They can have different values or norms, and during the activity of the community shared values are created. (De Jong, 2012). The community members choose which virtual means they want to use, such as blogs, forums, video conversations, discussion groups, and so on (Lieberman & Pointer Mace, 2009; Tang & Lam, 2014).

The creation of a shared language is critical to the continuation of the community's activity, since through this language there is negotiation on the meaning and understanding and effective communication is made possible (Shinefeld, 2017).

2.6 The Role of the Instructor in the Professional Learning Community

The teachers participate in professional learning communities to improve their professionalism and to help them in their work. They need conditions of time and place, which enable ongoing pedagogical discussions. The instructor's role in the community is to effect an improvement in the teachers' quality of teaching, to lead the teachers' community, to handle the pedagogical knowledge that is forming in it, and to make it accessible and useful for the entire community of teachers (Lieberman & Friedrich, 2010).

The instructor who leads a professional learning community is a teacher who has the power to be a leader of excellence in teaching and education. He has extensive knowledge in diverse areas of content and teaching and rich pedagogical and didactic expertise. In addition, he is gifted with leadership abilities and has interest in acting to cultivate the professional capability of the fellow teachers (Ben Peretz, 2009).

The instructor's role is unique and has many elements, such as the creation of routines of pedagogical discourse between teachers and the creation of pedagogical knowledge that connects between the experience in the field and contemporary theory and research.

The instructor leads the community both in the pedagogical facet and the disciplinary facet (knowledge domain) and creates a space in which the learning materials and pedagogical instruments in the discipline are developed (Weder-Weiss & Lepstein, 2015).

The instructor of the learning professional community acts during a defined period of time in the three different designations:

1. Instructor. Creates and instructs regular frameworks for peer learning and in general personal mentoring as needed, creates a culture of sharing knowledge, development and dissemination of knowledge, reciprocal productivity, recognition of importance of sharing successes, challenges, importance of their analysis, and opening the door of the classroom for observation and analysis of lessons.

2. Developer. Develops knowledge and pedagogical instruments. Documents, develops, and disseminates pedagogical materials so that they can serve fellow teachers.
3. Artist. Illustrates exemplary teaching and awakens inspiration that serves for observation and learning and analysis and extraction of pedagogical knowledge and the launching of teaching and learning processes inside the school or outside of it. The instructor's work includes actions such as documentation of teaching as a resource for analysis, conceptualization of quality teaching, willingness to allow observation of fellow teachers during the lessons, and identification of key points in the peer learning that can establish or launch the teaching of the topic (Michaeli & Somer, 2014).

The instructor of the community is responsible for dynamics in the community and the influence on the learning. The instructor must think about the nature of the built community, what causes its members to gather together, and what can undermine its ability to develop. He must be attentive to the different voices, desires, and needs of the different teachers in the community. He must know the community members and the relationships of power between them and ascertain that in the community the place of both newer and older teachers is maintained. The community instructor cultivates the belief and the systems of relations and if needed intervenes to influence the dynamics. The instructor promotes using the group cognitive research and emotional research. The goal is to increase and promote understanding, insight, and options of change. The process enables the identification of strengths, the connection to them, and the direction of them to development and creation and the increase of the feeling of ability and efficacy. All this – so as to facilitate the personal and professional advancement of the peers (Allen, 2016).

The community instructor leads internal processes of development in the community of teachers. He creates a culture of professional discourse in his work with fellow teachers, he clarifies and develops with them pedagogical and content knowledge, he develops the art of teaching through peer learning, and he holds a meaningful discourse with teachers, which is based on experiences, reflections, and feedback. The knowledge that emerges as a result of this activity is processed in a systemic manner, through

documentation, analysis, conceptualization of knowledge, and increasing its accessibility so that the teachers can make effective use of it and implement it in their learning classes (Lieberman, Hanson, & Gless, 2012).

The role of the instructor of the professional learning community has four main dimensions:

1. Accompaniment of the Team Learning Processes

The accompaniment of the peer learning processes focuses on teamwork and primarily on pedagogical discourse: the characteristics of productive pedagogical discourse in the teaching staffs (engagement in problems of practice, investigative position, honesty and willingness for exposure, representations, focus and construction, multiplicity of perspectives, sophisticated ways of explanation, repertoire of alternatives, and reflectiveness), how to observe a pedagogical discourse, what to observe, and how to instruct a pedagogical conversation. The goal of the instructor in a community is to improve the professional perspective of the teachers and to form parameters for the observation through the use of professional language. In addition, the instructor must make the teaching public, with reference to sensitivities that accompany it and the ways of protection that the teachers adopt so as to uphold their public image. “To see” and to understand a group means to see a human system that acts from the relationships and connections between its members and its components, or in other words, to see beyond the individuals who comprise the group and to know to identify the processes that occur in the group and to channel them to fill the goal and main task a productive pedagogical discourse that promotes learning and teaching (Trachtenberg & Lepstein, 2016).

The main instrument of the group instructor in the accompaniment of the team learning processes is the instruction interventions. The instruction interventions are connected to questions of the instructor’s authority, style of instruction, influence and leadership, and of course reciprocal relationships with the group. The instructor’s instruction interventions influence the space of the group discourse, its nature, and its quality (Trachtenberg & Lepstein, 2016).

2. Personal Accompaniment of the Teachers

The personal accompaniment of the teacher by the instructor is represented in the model of peer discourse as an alternative model to the traditional feedback and in questions of the development of efficacy, attention, and asking questions as a way of the development and empowerment of the teacher. The goal of the personal accompaniment in instruction is first and foremost the empowerment and development and thus less setting professional authority that gives, conveys knowledge, and provides answers. This approach calls for asking questions more than improving answers, in partnership and in reciprocity of the accompaniment, in the combination of challenging and support – all this with reciprocal learning (Avidav-Unger, Friedman, & Olstein, 2011).

3. Development of Intermediate Leadership in the Schools and Education in General

Personal accompaniment is intended to develop self-efficacy and traits of leadership in the teacher, from the recognition that the teacher has the ability to influence and to change. The aspiration is to develop learning and reflective teachers who have independent leadership and are committed to the constant improvement of their practice as teachers and of the pedagogy in the school in general (Oplatka, 2015).

4. Focus on Teaching and Learning

The role of the instructor in the pedagogical discourse in the community is to make certain that the dialogue will not deviate from the predetermined theme. However, sometimes flexibility is required on the part of the instructor for “deviation” from the discussed topic. The action of focus directs the group to engage in specific content so as to conceptualize things into a schema or rationale, a comprehensive idea, and creates in this way a basis for the broader and deeper discussion.

The focus of the teaching and learning is intended for reflection. Reflection is the way in which the instructor expresses the participants’ or the group’s statements in words that are a “mirror” of the contents the teachers expressed or their emotions. The goal is for the teachers to see themselves clearly through the instructor who serves as a mirror for them. The reflection of content enables the creation of clarity, the observation anew of

things, and the hearing of how they resonate in others. It helps make order and enables observation of attitudes and thoughts. The skill of reflection requires of the instructor listening, ability to observe, and presence in the “here and now” (Weder-Weiss & Lepstein, 2015).

The instructor’s role is to identify and extract the teaching contained in the teachers’ community, to hold meaningful and productive interaction between the teacher’s practical knowledge and academic knowledge, and to grow a professional culture of the teachers’ community based on trust and autonomy, responsibility, professionalism, and involvement.

The instructor of the community is a main agent for the development of intermediate leadership in the education system in general and in the schools in particular and for the cultural change intended to bring about the transition from an individualist and isolated culture of teachers and teaching to a collaborative culture and publicness of practice.

2.7 Contribution of the Professional Learning Community

Effective learning of teachers is expressed in the process that the teachers undergo as they belong to the learning community. The sharing in reflection, in pedagogical processes, in insights following observation of lessons are what create a new paradigm of active and involved learning, since the teacher in the community examines in parallel her conduct as an individual and her conduct as a part of the learning community. Hargreaves (2013) found that the most effective communities are those whose leaders respect and esteem the participants’ needs.

The research literature about learning communities for teachers indicates content factors and process factors that can contribute to the success of the learning in the community. Sjoer and Meirink (2016) address the content factors and recommend that every community focus on one topic, such as the development and shaping of lesson plans and teaching aids.

Learning communities contribute to the constant improvement in knowledge and professional skills of the teachers and their sense of efficacy to lead their students to achievements. The teachers' feeling of efficacy rises when the professional learning and planning are undertaken together in teams. These two variables – knowledge and professional skills as well as sense of efficacy – are directly related to the students' achievements (Balenga, Landler-Perdo, & Shachar, 2011).

In the meetings of the staffs of teachers, their ways of teaching and their influence on the students' learning are examined, defined goals of the teachers' teaching and the students' learning and achievements are set, and they strive to achieve the goals and evaluate the regular degree of the goal achievement.

In addition, the teachers share with one another what is done in their classes and even hold peer observations and reflections of them. They plan together lessons, tasks, and test, and they discuss together the students' work, the students' specific difficulties, and the ways of coping with these difficulties in the teaching.

The participants reported that a culture and atmosphere of trust are what helped the success of the community. When such a culture is created, the activities of reflection and inquiry flourished. Outside information provided by the organizers regarding the practices outside of the school also contributed to the theoretical and practical learning. Over time, among the teachers in the staff perception and understanding of the best teaching develop, and a culture of collective responsibility for all the students develops, not as a slogan but as a real intention (Dufour, 2004; Timperley, 2008).

Teachers who are involved in cooperative learning with colleagues for the most part indicate about themselves that they can change or modify their teaching methods as a means for the improvement of the learner's learning and success. In addition, professional interactions create cooperative collective memory, which is unique and more developed than individual memory, since they incorporate activities, processes, and methods of the organization's members. Shared consultation among the community members strengthens one another and leads to commitment and attachment to professional learning (Hargreaves, 2013).

Furthermore, the professional learning community in the school framework improves the quality of the teacher's learning and develops professional teachers who will lead to measurable positive improvement in the learners' achievements (Coreland & Shahaf-Barzilay, 2013).

Cooperative learning is a part of the professional learning culture. Thus the learning needs to be based on critical social life undertaken in a constant dialogue. Therefore, all the participants are partners and responsible for the actions of the collective, and the dialogue is both the means and the end and all the participants express emotions, attitudes, and meanings in a way of speaking. The learners can work together in different ways that constitute an addition to the knowledge of each one and can overcome the intellectual challenges that cannot be solved alone. Cooperative learning in the group leads also to the commitment of the learners and the teachers to ideas, processes, and activities. In addition, the cooperation needs to be the goal and not only the means in the educational activity. The commitment of the teachers to the community rises when they initiate a change autonomously and receive support in the planning and assimilation of the changes they proposed (Sebastian & Allensworth, 2012).

In professional learning communities the responsibility for the transfer of the knowledge is placed in the hands of the teachers themselves and not in the hands of an outside factor and thus a community grows in which teachers become students and leaders in a variety of activities. A feeling is created that the teachers themselves are the ones who lead the learning process. The teachers intelligently understand that cooperation is a powerful tool for learning. Moreover, the teachers feel that the knowledge they accumulate during their years of work is respected, trusted, and supported. The teachers share their methods of teaching with one another as something routine and the main activity in the community is dedicated to learning from the other and reciprocal feedback. The teachers feel that their knowledge is treated with respect and there is recognition of its importance, authenticity, and complexity. The teachers understood the tremendous advantage of sharing and building a community as opposed to passive and individualized learning (Lieberman & Miller, 2016).

The recognition of the importance of the professional learning community derives also from contemporary pedagogical perceptions that describe the learning as a process that occurs in social-cultural context. According to these perceptions, learning exists in the interaction among people, from the close relationship between learning and practice and from sharing in the practice in the professional community. The social-cultural perception of the learning suits also the class of children and the staffs of teachers (Sellermeier, 2018).

In the learning community there is an active and dynamic process of learning and reciprocal productivity with personal and group reflection, and at the end new knowledge is created. The goal of the community is to assimilate the knowledge and adjust it to the members of the community after the identification of their needs and abilities. The learners in the professional learning community are exposed in the school environment to a consistent model of ‘lifelong learning’. They see personal examples of adults who search for learning opportunities and enjoy the achievement of new information. In addition, a learning community offers its members support in light of new challenges. A culture and atmosphere of trust in the community facilitate the success of the community. When such a community is created, activities of reflection and inquiry flourish (Mushayikwa & Lubben, 2009; Vieluf, Laplan, Klieme, & Bayer, 2012).

Sharing is a main characteristic of a professional learning community. Sharing is more than sitting together in team meetings: it entails disclosure, openness, and making the teaching practice public. Work through sharing contradicts the reality of the teachers’ work in many schools, which is work under conditions of professional isolation. It requires a certain surrender of the teacher’s independence and the enrooted perception of the teaching as individualistic work.

In cooperative conversations the participants are asked to share with one another what traditionally is considered private – objectives, strategies, learning materials, pace, questions, concerns, and outcomes. The discussions place at every teacher’s disposal somebody she can turn to and talk with and are built explicitly for the improvement of the teachers’ work in the classes – both their personal and group work (Donmoyer, Yennie-Donmoyer, & Galloway, 2012).

A learning community has many advantages:

1. The community allots an appropriate framework of time and a comfortable physical environment for every member in the community. It is an including environment with a climate of trust and openness between members (Fullan & Hargreaves, 2016).
2. In the community a dialogue develops between members, thus creating new knowledge. This dialogue creates a sense of belonging to the group. In addition, the involvement of the teachers in the process of making decisions following a productive conversation increases the teachers' perception of self-efficacy and increases the motivation to participate in the community (Blanga, Landler-Pardo, & Shachar, 2011).
3. In the community, a constant process occurs in which the teachers develop both personally and professionally, such as engagement in emotional and social aspects of the teachers' experiences and promotion of learning that enables the transmission of knowledge (Mitchell, 2013).
4. In the community there is continuous improvement based on change and empowerment. The community expresses trust in the teachers' ability to innovate, create, and act for change (Park & So, 2014).
5. In the community, there is a process of the learning of different topics relevant to the learner and to the educational activity. In the community, the contents the teachers address belong to the class life and work practices, according to their levels of knowledge and experience (Jappinen, Leclerc, & Tubin, 2016).

2.8 Difficulties of Professional Learning Communities

There are many difficulties on the teachers' path to become teachers who learn and renew through collaborative learning in a professional community. One of the main difficulties in the building of the professional learning community is the problem of time and the inculcation of practices (Artzi, 2014; Shulman, 1996), since the learning process in the professional learning community requires time. Time is required so that the members in the community will know one another, will trust one another, and will believe in one another.

Thornton (2010) indicates a problem in the willingness of some of the teachers to participate in the community and difficulty in meeting the schedule that brings them to feel that they are found with lack of time that makes it difficult for them to focus on the teaching tasks.

De Jong (2012) indicates difficulties from the sources related to time. She notes that learning communities will not function optimally in an organizational culture that does not support the critical examination of the teaching practices but the problem is that in terms of time there are not always adequate opportunities for reflection with meaning and professional growth. Time is a critical factor, and many teachers are concerned that the time at their disposal to integrate and assimilate the innovations they learned in the communities is limited.

A difficulty of a completely different type lies in the processes of change in the personal and professional identity that the teacher experiences during her participation in the community.

The learning in the community for professional development for teachers can be interpreted and perceived also as a change of identity and not only as the acquisition of knowledge. The identities of the teachers, like that of every worker in other professions, are built on the basis of the integration of factors and influences on the institutional and personal levels. Most teachers find it difficult to neglect the identity of the 'traditional teacher' and avoid participating in communities or participate in them passively.

The teachers are forced to cope with two competing identities. One identity is that of a liberal teacher, an identity forced upon them by the system, while the other identity is that of a traditional teacher, an identity built over the years (Liu & Xu, 2013).

Sjoer and Meirink (2016) indicate differences in the styles of thinking and learning of the teachers as a factor that makes the learning in the community difficult. Teachers are different from one another in needs, ideas, and experiences. Such differences and others make it difficult for the teachers to cooperate in the building of the curriculum. The researchers note another difficulty that lies in that the teachers are a heterogeneous group

in terms of the age group that they teach and recommend having groups of teachers whose members teach similar age groups.

It is possible to identify another difficulty following the information revolution that we experience in recent years, the multiplicity of the information and access create opportunities to have a community of learners in which its members can have two types of discourse: a face-to-face discourse in formal and non-formal encounters and in different compositions and online conversation. Each one of the types of conversation has a potential role and contribution. Of the two, the online discourse is newer, although a face-to-face conversation as an institution is considered also an innovative component in the learning community (De Jong, 2012).

The researchers further maintain that many teachers have encountered a difficulty in expressing open criticism on their peers' work and have called the weak criticism 'safe talk'. The cooperation missed its goal if teachers rely only on the encouragement and are not involved in critical dialogue of their peers' activity, which is called 'sharing'.

Another difficulty is related to change in the work of the teacher, who is accustomed to work alone. Despite the perspective that work in cooperation will yield better training, it is still possible to find in many schools the loneliness of teachers. Even in the schools that adopt the idea of cooperation, the desire of the staff to work together ends at the classroom door. Only through professional dialogue is it possible to make the school a professional learning community.

When we speak about cooperation, we intend the process that all the teachers will work together so as to analyze and improve the learning in the learning classes. The teachers must work in teams and bring up questions that will promote in-depth staff learning. This process will lead in the end to high levels and high achievements of the learner (Dufour, 2004).

Sometimes, the learning in a professional learning community causes tensions and conflicts. One of the expressions of the participation in the learning community is a

situation of lack of agreements, challenges, and competition between the group members (Bania, Yakobzon, & Zadik, 2013).

The transformation of the teaching staff into a professional learning community may be perceived as invasive and threatening. Therefore, the establishment and development of a professional learning community is the leadership of a process of change in all respects, and it is necessary to take into account the perceptions that exist among the teachers and to think how to work with them. In addition, it should be recalled that this is a process that takes time and requires investment, recruitment, and creation of conditions that will support the teachers in the process.

Summary

The chapter described how the dynamic pace of life requires the schools to possess the ability to frequently update themselves with new innovations. A professional learning community constitutes an excellent response for this need, since it enables professionals in a certain field of knowledge to examine and improve the practices and knowledge that serve them together and continuously and to develop personally and professionally.

The members of the community engage in the development of processes, strategies, and structures for collaborative learning, adjusted to the situations of change and uncertainty. The community encourages openness, initiatives, and experiences, and although its main occupation is in knowledge, the social framework and the shared experiences are what establish the professional identity and give a feeling of meaning and satisfaction. The community supports the coping with challenges in the immediate work environment and because of the community the members enjoy lifelong learning in practice.

The chapter presents the important characteristics of professional learning communities, including reflective dialogue, research of practice and feedback, structured mechanisms for teamwork, data-based learning and assessment, and collective focus on the students' learning as an indicator of the joint commitment to their success. At the head of every professional learning community there is the leading principal, who is responsible

for accompanying the team learning processes, for the focus on teaching and learning, for the personal support of the teachers, and for the development of the intermediate level leadership in the schools in particular and in the education system in general.

The contribution of the professional learning community is apparent in the constant improvement in the professional skills, contemporary knowledge, and feeling of efficacy of the teachers to bring their students to achievements. The responsibility for the sharing of the knowledge and acquisition of knowledge is in the teachers' hands, who even have recognition of the importance of their authentic knowledge. They are the ones who lead the learning process, and thus a community grows in which they are both learners and leaders. The challenges of the community are differences of opinion and competitiveness and assimilation of the understanding that this is a lengthy process that necessitates the recruitment of time resources and mental availability.

The following chapter discusses peer learning, the principles and characteristics of pedagogical discourse, and the contribution of peer learning.

Chapter III: Peer Learning inside the Modern School System

Peer teaching is one of the many forms of learning and teaching. It constitutes a long-term guided framework in which the participants who have a common denominator in terms of professional-content and/or role can bring up and examine together the professional issues they engage in, research together their experience in the role, learn from one another from the practical experience that accumulates about approaches, ideas, and solutions for coping with the topics on their agenda, draw lessons, and form recommendations and ways of action, develop beneficial relationships and strengthen because of the interaction with their peers (Wasilk & Hindman, 2011).

Henning, Weidner, and Marty (2008) note that peer learning includes three important elements: first, their age group peers are from similar social groups who learn and teach, second, their peers who provide help are not subject or 'expert' teachers, and third, the two sides enjoys a partnership, some in learning and some in learning through teaching.

Peer learning invites the engagement in the content world of teaching and learning and is intended to improve it. The learning is defined as an active process built by the learner (the teacher), or in other words, she produces the knowledge according to her needs and her previous experience. The teacher decides what the contents and insights that developed from the teaching are. The process, according to the present definition, is cyclical, or in other words, constant learning occurs following every process of teaching.

The learning extends the teacher's content knowledge and simultaneously improves her didactic knowledge (teaching). The teaching is therefore a learning experience, or namely, it has actions and contents from which the teacher can produce new insights on the nature of the learning, the teaching, and on herself as a person and a student (Yariv, 2007).

Cooperation between peer teachers leads the teachers to act in the framework of the learning group that attempts to evaluate the students' understandings, to shape, plan, and

implement new ways of teaching and to reflect on the teaching of its members. At the basis of the project there is the assumption that conversations among colleagues, children, or adults are essential to the building of meanings (Dayan, 2016).

The teacher is literate and leads in the field of teaching-learning in the school arena. Therefore, the work on new ways and challenges in teaching enables the expression of different perspectives and beliefs. The teachers display different patterns of teaching, agree, share, and weigh alternatives. The goal is not only to improve the teaching methods in the classroom but also to inspire and reinvigorate intellectual growth, through special emphasis on knowledge of the content areas (Leijten, & Chan, 2012). In addition, the pattern of organizational-pedagogical practice occurs in the school space. It is related to students as a group of learners and colleagues, and its main content is teaching-learning in the school framework. The teacher sees herself and her students as a part of the community of learners-teachers in the school. She learns from her peers and teaches them, cooperates with them on topics related to the content areas and teaching methods, and advises and is advised.

The teacher does not hold formal positions of leadership, but she draws others after her in the teaching action and acts to advance the leadership of the school. The teacher still remains in her class, but this serves as a basis for activities undertaken in the general space of the school and as a motive of them (Friedman & Gavish, 2013).

Peer learning constitutes a unique channel for learning for teachers, in the intra-organizational or inter-organizational framework. It relies on the perception that learning is an interactive process in which new knowledge is created by the transformation of experience. It is based on unique methodologies that implement in practice the unique principles of active partnership, enabling, creating, and supportive. As a result, peer learning fits in the constellation of methods of learning and guidance in management and organizational topics with the presentation of significant added value and emphasis of the relevance of the learning and its effectiveness (Parr & Timperley, 2010).

Peer learning emphasizes a personal process in which the learner is active in the construction of knowledge and the creation of new knowledge on the basis of previous

knowledge existing in him. The learning is an interpretative, personal, and unique process of building, in which every learner processes and interprets actively what she learned. In addition, the learner attempts to build meaning for these contents.

Peer learning implements from the constructivist theory many learning principles, such as learning is the outcome of development, learning is development. Reflective abstraction is the force that motivates learning, and dialogue in the community causes additional learning. In the community of learners there is a conversation that engages in activity, in thinking, and in discourse. On the one hand, there is the personal aspect of the learning and in this the importance of the reflection to learning, and on the other hand, there is the social-cultural aspect of the learning, in that it is harnessed when it occurs in the discourse community. When emphasis is placed on the place of social mediation in learning, it is necessary not to ignore the personal learning of each one of the learners (Keenan, 2014).

3.1 Characteristics of Peer Learning

Peer learning is not one practice. It covers a wide range of different activities that influence and help the teachers' learning processes (Leftsein & Snell, 2011).

In peer learning, it is possible to identify a number of characteristics, as follows:

1. Dialogic management of the frameworks for the teachers' learning, frameworks in which the voice of the teachers is heard and they can present a critical position towards knowledge, think together, and enjoy relations of support and concern (Van Driel, 2012).
2. Learning in a supportive professional community that enables the development of language, vision. Teachers learn from one another the way to engage in the shared problems and shared work on daily tasks such as choice of the learning materials, planning lessons, shaping of tasks, response to problems, and reference to specific students (Harrison et al., 2008).
3. Motivation of the learning processes through evidence that originates in the classroom (Borko et al., 2011).

4. Active involvement in the construction and interpretation of knowledge through the suitable balance between external and internal sources of knowledge (Whitcomb et al., 2009).
5. Learning that is ongoing and not one-time and that reflects cohesion of different types: the different goals of the learning framework and its planning, the content goals, and the general policy in different levels in the system (school, district, state) (Andrews & Manning, 2016).
6. Peer learning revolves around relevant problems that those training in the field address (Cordingley, 2010).
7. Each one of the peers contributes and is contributed to from the group and the learning. Consequently, two-way activity of reciprocal learning is created. In addition, peer learning causes the display of a sense of responsibility for the learning, along with their peers (Khaw et al., 2011).

3.2 Pedagogical Discourse among Peers

Professional learning of teachers occurs through pedagogical discourse, or in other words, conversation that engage in learning and teaching. In this discourse the teachers share with their peers their practices, so that they can learn from the challenges, the problems, the dilemmas, and ways of coping of one another.

The teachers research together the act of teaching, share and develop knowledge and expertise, expose implicit perceptions, and shed light on different perspectives. Pedagogical discourse engages in the content domain, such as mathematical knowledge and general pedagogical aspects such as class management, challenging students, and value-oriented issues. The very discourse on pedagogical topics does not necessarily ensure meaningful learning. The learning depends on norms of discussion and cooperation, or in other words, the quality of the discourse. The teachers are required to adopt a collaborative and investigative culture, to be willing to examine critically their action, and to see themselves as the creators of teaching. Thus routines of communities that engage regularly in analysis and development of teaching practices are created (Azulay, 2016).

Fiarman (2015) emphasizes the need to build school arrangements and to develop applied tools that will support the process of teacher growth. She holds that these three levels – professional culture, school arrangements, and applied instruments – are essential to every process of sustainable pedagogical change. In addition, a productive pedagogical discourse as a part of the work routine in the professional learning community requires space for shared work and reciprocal learning and making the teaching public, such as opening the classroom door and filming the lessons.

Pedagogical discourse invites a team culture that is based on norms of discourse that support cooperation, openness, and reciprocal learning. Thus a safe space is created in which difficulties, challenges, and failures invite learning. Generally, work and productive learning in the team do not occur themselves but necessitate leadership to lead it.

In the instruction of the pedagogical discourse, an outline is used (see appendix number 1), which includes goals, rationale, constellation of activities, and discussion, continuum of activities, division of time, guiding questions, and guiding emphases. This is an aid for a productive pedagogical conversation and the creation of norms of participation in the discourse of teaching practices. The outline of the discourse is an anchor for the development of norms of conversation on the practice. It helps the community instructor develop expertise in the guidance of a meaningful professional discourse among the team members (Scriver et al., 2003).

The principles of pedagogical discourse include: a structured conversation in which there is a distinction between the different components of discourse, holding a concrete and authentic dialogue on the problem of practice, separation between the description, analysis, and understanding of the case and the search for ways of coping, focus on the topic of the discussion and its goal, multiplicity of viewpoints and perspectives for the increased depth of the understanding of the issue, and last, examination of a variety of alternatives for coping, while thinking about the advantages and disadvantages of every alternative.

Through the pedagogical discourse, the teachers identify specific problems in the practice related to the promotion of teaching and learning. Productive pedagogical

discourse is characterized by the focus on teaching and learning, involvement in problems and dilemmas, critical discussion, anchoring the discussion on representations and evidence, and investigative attitude: description before analysis, before judgment, before solution, balance between criticism and support, multiplicity of viewpoints and productive tension between them and norms of participation, reciprocity, listening, honesty, and willingness for exposure.

The pedagogical discourse is accompanied by rules of ethics. The rules of ethics were intended to create a safe space and to enable the creation of a learning culture based on the public practice, in ways that will be fair and secure for the teachers who observe them. It is desired that the rules of ethics will not be “imposed” on the staff as holy dictates” but will be examined and perhaps even phrased and formed in a shared process. It is important to review the rules of ethics before observing a lesson.

The pedagogical discourse makes the learning in the community a shared issue; the encounter between the accumulating knowledge of the teachers and new concepts and ideas creates an opportunity for authentic professional development relevant to the teachers’ reality. The discourse enables teachers to base the theoretical principles they acquired in conversations. The processes of pedagogical discourse give the teachers a time resource and professional support that enable them to engage in professional development and improvement of the teaching (Bochlezev et al., 2017).

3.3 Contribution of Peer Learning

Peer learning empowers the participants and causes them to be active and to cope with challenges. Peer learning has many advantages.

The members of the community are committed to in-depth personal familiarity and cultivation of continuous involvement of the peers. Peers learn from one another most effectively when they engage in long periods of time. To cultivate profound and experiential cooperation among peers, the assurance of ongoing commitment is the key (Andrews & Manning, 2016).

The peer learning experience enables the leverage of further added value, which is challenging and empowering and pertains to the self-examination of the participants of themselves versus their image and perception by their peers in the group, as well as their teamwork. In the sessions the peers learn from one another and analyze their work, which thus influences the cognitive development, motivation, and trust among the group members (Hammond et al., 2010).

Peer learning ascertains that the entire group experiences positive reciprocal dependence, face-to-face interaction, and group processing. Positive reciprocal dependence emphasizes the importance and uniqueness of each one of the group members. When the peers communicate with one another, they take upon themselves leadership roles, acquire conflict management skills, discuss and clarify concepts, and ‘unstitch’ the complexities of human relations in the given relationship. This process improves their learning results (Kam et al., 2010).

Peer learning helps teachers develop learning abilities with self-direction, critical thinking, creative thinking, in-depth understanding of the contents and concepts, and skills for problem solving (Andreanoff, 2016).

Peer learning motivates teachers to engage in the research and analysis of the topics that they present and thus improve the quality of their learning process. This analysis of the peers helps them build ‘smart tools’ that will help the teachers improve their practice and consequently their students’ achievements (Bell et al., 2010).

Research studies indicate that the learning activities of peers generally cause the following to occur:

1. Construction of more supportive teams and relations.
 2. Higher psychological welfare, social ability, communication skills, and self-esteem.
 3. Higher achievement and greater productivity in terms of improved learning results.
- (Keenan, 2014).

Summary

The chapter described the peer learning as a long-term guided framework and one of many forms of learning-teaching, intended for participants with a professional, content, or functional common denominator. The goals are the improvement of the ways of teaching in the class and the encouragement of intellectual growth, primarily in the content field. Peer learning exists in an intra-organizational or inter-organizational framework as a unique channel, according to the perception that learning is an interactive process of the creation of new knowledge through the transformation of experience. The characteristics of peer learning include pedagogical discourse that invites the expression of a range of opinions and critical attitudes, shared thinking and work about the daily tasks, mutual support, motivation of learning processes on the basis of evidence from the class, response to problems and reference to specific students, and balance between external and internal sources of knowledge.

The peers bring up and examine together professional issues, research their experience in the role, learn from each other's experience, develop supportive relationships, and grow stronger because of the interaction between them. The mutual learning is created because each colleague contributes to learning and is contributed from it, and it empowers the participants and encourages them to act and cope with challenges. The peers can even examine themselves and their teamwork against the way they are perceived by their fellows in the group.

Peer learning helps teachers develop learning abilities, critical thinking, and creativity and research studies indicate its prominent advantages: building more supportive teams and relationships, sense of personal wellbeing, communication, sociability, and improved self-esteem, and better achievements and higher productivity.

The following chapter will discuss the characteristics of the lesson study model as an instrument for the professional development of mathematics teachers and will describe the instructor's role in the lesson study.

Chapter IV: Lesson Study. The Model and the Meaning for Modern Teaching. The Case of Mathematics Teachers.

Lesson study is a process of ongoing professional and collaborative development developed in Japan. The expression ‘lesson study’ is a literal translation from the Japanese word *Jugyokenkyu*, where *jugyo* means lesson and *kenkyu* refers to study or research. The translation can be misleading, since lesson study is more than the study of lessons; rather it is an investigation of teachers into their own practices through their planning, conducting, observing, and reflecting on research lessons (Corcoran, 2011a).

Lesson study is a spiral process of professional development of teaching staffs that invite possibilities for the improvement of the teaching through emphasis of processes of learning of students in the class. Lesson study enables the staff to act together, to examine their teaching, to investigate it, and to improve it methodically. Research studies indicate that the process of lesson study leads to the improvement of the teaching and the achievements of the students in Japan (Stigler, & Hiebert, 1999; Toshiya & Toshiyuki, 2013).

Lesson study engages in routine actions that comprise the teacher’s work. It presents the teacher’s routine work in another light: fascinating, meaningful, complex. It returns the teachers to the beauty of the profession, to the differences between the students, to the understanding that there are no simple solutions and that only with shared strengths of teachers is progress possible and there is no reliance on contemporary technological skills.

This process obligates the teachers to focus on the routine, on the everyday work, and thus it pushes to change something from the inside, in an essential manner. It opens with the questions “what is hard to learn?” and “what doesn’t go well for us?”. It helps teachers be honest with themselves and their peers and offers them the possibility of sharing in the process.

A unique aspect of lesson study, which differentiates between it and other manners of professional development, is expressed in that the lesson that is observed and researched puts the discourse on the teaching practice to the test of reality and bridges between theory and practice. Because of it, the teachers can lead their ideas into the classroom and examine them systematically (Gonchar-Newman, Rolffhus, Keys, Taylor, & Gersten, 2014).

The process began in Japan with the goal of examining the teachers' process of learning. The main component in the success of the mathematics teachers in Japan is the process of the lesson study. Lesson study includes a group of teachers who work together on a broad goal and develop lesson plans that are observed, analyzed, and written anew. Their focus throughout the entire process is on the improvement of the students' thinking and the transformation of their lessons into more effective ones.

Most of the teachers in Japan have experience in the development of the lesson plans for the lesson study. These lessons are different in pattern and contents from the lessons that Japanese teachers use in the everyday teaching (standard lessons) (Cajkler et al., 2013).

Lewis (2000), who investigated over a number of years education in Japan, found that the teachers of sciences in Japan succeeded in changing their approach in the teaching of the sciences from 'teaching as an action of transference' to 'teaching for the purpose of comprehension'. One of the main means that led to this essential change in Japan was based on the study of the cooperative lesson plan. The planning of the lesson plan is nothing new in the pedagogical literature. However, the planning of the lesson in the peer learning and its examination especially characterizes the work culture of the teachers in Japan (and in South Korea) (Lewis, 2000; Saito & Atencio, 2015; Stigler & Hiebert, 1999).

4.1 Stages of the Lesson Study Model

The lesson study model is a model that focuses on the ideological understanding of mathematical concepts and the construction of the connectivity required for the in-depth understanding of mathematical ideas. This model relies on the approach that focuses on

mathematical ideas and not on the approach of the presentation of considerable information that relies on the student's memory (Heibert & Grouws, 2007).

This model focuses the students on the significant understanding of the ideas and procedures and has direct impact on the student's achievements. The model represents a different approach in its nature from the approach according to which the teacher explains and illustrates and then the students perform practice and repetitions. The assumption is that learning based primarily on many repetitions, routine practice, and reconstruction of skills on the low thinking levels helps the students perform on the tests the standard tasks, similar to those they practiced. In contrast, learning based on in-depth understanding of ideas and contexts will facilitate the development of the thinking on a high level and the development of the ability to solve problems (Morris & Hiebert, 2011).

The large problem that faces the teacher is how to plan lessons in which there are components that will cause the maximum of learning.

During the planning of the lesson, the teachers predict how the students will respond to specific activities. This requires the teachers to think about and re-evaluate their teaching approaches. This thinking leads to insights and to the change of the teaching methods (Verhoef et al., 2015).

This problem becomes more severe because of the broad supply of models of teaching. Many teachers feel strangled from the wide variety of aspects that present what teaching the teaching needs to be and they chose not to exert judgment and to rely on the textbook that was found in their hands or on the model that they were accustomed to as students or that they trained on during their years of work. The goal of the process is to support the planning of the lessons with high qualities and to help perform evaluation and effective reflection on the lesson, when focusing on the elements that most influence the learning of the students. In this process important elements are presented that need to be taken into account when a lesson is planned, such as analysis of the significant situations in the lesson that cause conceptual understanding, deployment step after step of the development of the in-depth understanding of the mathematical idea, choice of key

questions, and integration of evaluation that will accompany the teacher and be a factor that influences her decisions during the lesson.

It is important to note that throughout the entire process the staff of teachers bears the joint responsibility to prepare the lesson, to hold it, to implement it, and in the continuation to develop the teaching process (Murata, Bofferding, Pothen, Taylor, & Wischnia, 2012).

The Japanese study of the cooperative lesson is based on the following eight continuous work stages (Stigler & Hiebert, 1999):

1. Definition and study of the problem. The teachers set a common goal or focus on the research question in the teaching of mathematics that includes skills or attitudes that they want to cultivate among their students.
2. Joint planning of the lesson. The teachers choose a lesson from the curriculum that should be developed according to the basic pattern of the lesson plan. This pattern focuses on the way in which the lesson suits the curriculum, through the linkage of the topic and skills of the lesson to the content learned before it and to the content that will be learned after it.
3. The implementation of the lesson by a teacher from the staff and observation by the rest of the staff members. One of the group members teaches the lesson, and the rest of the group members observe it. The observation focuses on the students' thinking and not on the teacher's abilities.
4. Reflective feedback conversation. The group meets to discuss the lesson and the participants' observations. It is recommended that the discussion after the lesson be held as close as possible to the study lesson, so as to reflect precisely the students' events, the development of the topic, and other elements in the lesson (Lewis & Hurd, 2011).
5. Planning a new lesson. Corrections are made to the lesson, based on the observations and the analysis of the participants. Another member from the group is chosen to teach the same lesson again. The process of observation, discussion, and correction is repeated.

6. Use of the lesson by another teacher in another class. The process of the observation, discussion, and correction is repeated.
7. Additional evaluation and reflection about the improved lesson plan.
8. Sharing knowledge among all the colleagues in the group regarding the results and lessons. At the end of the process, the group writes a report that emphasizes what they learned in the context of the topic and their research goal (Lewis, Perry, & Hurd, 2009).

It is possible that the learning group of teachers will at the beginning have only some of the main components of the process, instead of performing the process in its entirety. All these stages of the work obligate true teamwork, sharing knowledge, and commitment to dedicate time to the improvement of the shared product.

4.2 Lesson Study as an Instrument for the Professional Development of the Mathematics Teacher

The learning process in lesson study has the potential to provide teachers with opportunities to learn in the peer groups, to see the learning of the students critically, and to reflect their teaching methods. Therefore, the teachers are required to present in-depth understanding and the ability to solve complex problems.

The mathematics lesson must be meticulously planned when many components, such as choice of tasks, asking questions, management of the discussion, illustrations, examples, planning of the mathematical work for a large number of students among whom there is great heterogeneity, practice, and homework, need to be integrated in them. It is not easy to plan a lesson at a high level; this requires considerable time and requires calculated planning in which there are many considerations.

Therefore, in every lesson it is necessary to pay attention to the following components:

- The mathematical content of the lesson – Choice of the mathematical skills or topics. A teacher who plans an effective lesson needs to ask herself what she

expects her students to know or what she expects the students to be able to do at the end of the lesson.

- The mathematical tasks of the lesson – Which problems, investigation tasks, or other activity will be given to the students during the lesson?
- Planning desired outputs – which products can prove to the teacher and to every observer from the side present in the lesson that most of the students achieved the goal of the lesson?
- Opening and ending – How to use the first five minutes of the lesson? Which relationships of the teacher need to be created in the discussion to enable the students to have significant learning during the activity that will come afterwards? What summary will there be at the end of the lesson?
- Comments and reminders to the teacher – Which concepts, relationships, common mistakes, and mistaken typical perceptions need to be taken into consideration before the lesson and during the lesson?
- Products and homework – Which products of the students will be presented at the end of the lesson or activity?
- Reflection of the teacher after the lesson – Comments that need to be recorded after the lesson to praise the planning for the next time.

These components help the teacher understand the place of the topic in the curriculum and in the overall learning constellation of mathematics. The planning of the lesson study focuses on the participants, planning of questions of higher order thinking, thinking about strategies of problem solving, and erroneous perceptions of students.

Research studies indicate that teachers who participate in the lesson study process undergo a professional process in which they achieve pedagogical insights that lead to differential teaching. These insights are expressed in their role as teachers. The teachers understand that they must focus on the creation of learning situations of inquiry and not only the dissemination of content and that they must involve the students in active learning so as to create meaningful learning. In terms of teaching strategies, the teachers create learning environments that necessitate peer learning, with the aim of creating a productive discourse and sharing thinking strategies and responsibility for personal and group

learning. Additional insights of teachers in the lesson study process is the identification of their students' learning strategies, difference between the learners, and intelligent use of the choice of assignments and means of illustration (Gess-Newsome, 2015; Verhoef et al., 2015).

Many researchers noted in their research works the effectiveness of lesson study. This effectiveness is expressed in the improvement of the quality of the teachers' teaching and learning and increase of the depth of the mathematical and pedagogical knowledge (Jacobs et al., 2010; Lewis, Perry, & Hurd, 2009).

Improvement in self and group feedback, with the goal of developing pedagogical discourse, promotes learning and building a culture of reciprocal responsibility (Hunter & Back, 2011; Toshiya & Toshiyuki, 2013).

In the model of lesson study there is a great contribution to the accumulation of the teachers' professional knowledge (Campbell et al., 2014). This process encourages the teachers' personal development and strengthens the relationship between the teacher and the staff. The teachers' involvement in the process deepens over time.

The teachers who participate in the lesson study process are those who cause the work to grow and are not experts. They feel they have greater ownership of the process and consequently their professional security is increased, as is their sense of satisfaction with the work of teaching mathematics in the school (Lewis et al., 2009).

Lesson study provides a nonthreatening environment for the teachers who participate in the process. Lesson study addresses the teaching as work with intellectual requirements and not as a collection of skills that should be implemented (Corcoran, 2011a; Jacobs, Lamb, & Philipp, 2010).

4.3 The Role of the Instructor in Lesson Study

Instruction in lesson study effects an intensive change and develops the teachers' professional knowledge. The instruction is composed of many elements and acts to lead systemic changes in educational staffs in the education institutions.

The role of the instructor in the process of lesson study was undertaken from three primary aspects: functional professional aspect, socio-psychological aspect, and aspect of evaluation, reflection, and feedback (Stigler & Hiebert, 2016).

To achieve this mission, the instructor advises, defines, directs for results, leads change, assimilates, supports, challenges, includes, listens, conducts dialogue, acquaints the peers with innovations in the curriculum and teaching methods, holds follow-up and feedback, holds instructional and reflective discourse, and conducts a structural conversation.

The instructor is the most important figure in the group. His role is to serve as a catalyst, to be involved in the structuring of the activity and the structuring of the knowledge, and to offer interpretations how to avoid knowledge-based takeover of the learning process.

The climate and atmosphere created in the group depend greatly on the instructor's personality and behavior. He is a factor of many meanings for imitation and identification, and he must respond with empathy, warmth, and respect. He must create the optimal conditions for open learning, with encouragement of active involvement. It is important that the instructor feel free and spontaneous and be capable of expanding the processes that occur in the group in a structured manner. The instructor guides the group members for a focused discussion, for exposure, for finding the contexts and meanings in their lives and in their interpersonal relationships outside and inside of the group, and he is aware of the interpersonal references and meanings beyond them.

Another role of the instructor is support and protection. He must alleviate the concern of the teachers regarding observations, peer learning, and receiving and obtaining constructive criticism.

This change causes the promotion and growth of the teachers, both in personal terms and in professional terms (Hall, 2009; Ponte, Quaresma, Baptista, & Mata-Pereira, 2014). The instructor has a great contribution in the professional pedagogical aspect in the

success of the process of the planning of the shared lesson and in the improvement of the quality of teaching of the peer teachers (Rock, 2016).

The instructor's role is to make the teacher into a greater expert, both in the pedagogical field and in the didactic field. The teacher's expertise is characterized by three levels (Sugiyama, 2008):

- On the first level – A teacher can convey to the students the basic ideas in the form of facts, concepts, and procedures (teaching by giving).
- On the second level – A teacher can explain the meaning and reasons of basic important ideas so that the student will understand them (teaching through explanations).
- On the third level – A teacher can create for the students the opportunities to understand the main ideas and to support their learning so that they will become independent learners (teaching based on independent work of the students).

The requirements presented by the Supervision of Mathematics in Japan are that the teachers need to be at least on the second level and should aspire to attain the third level. A teacher who works on the first level is considered a poor teacher who does not have a place in the system.

The development between the levels is based on cooperative work of the staff of teachers who plan together, observe, critique, and are examined on their performance in the classes. A teacher cannot reach the third level only from courses, in-service training, lectures, and textbooks.

The instructor must aspire for as many teachers as possible to be the third level. This is a demanding and long-term process. To develop this skill, the instructor undergoes with the teachers a process of 'refinement'. This is a process of the updating of their knowledge of teaching along with a component of reflection (Takahashi, 2014).

The goal of the instructor is to support the planning of lessons of high quality and to help perform evaluation and active reflection on the lesson when there is focus on the components that most influence the students' learning. The instructor needs to take into

account important elements when the lesson is planned, such as analysis of significant situations in the lesson that cause conceptual understanding, deployment step after step of the development of in-depth understanding of a mathematical idea, choice of key questions, and integration of evaluation that will accompany the teacher and be a factor of influence on her decisions during the lesson.

The instructor presents points that need to be addressed in the stage of the planning and in the stage of the supervision of the performance. He also supports the process of the thinking team of teachers who plan together a lesson and gives instructions. He answers questions that can help in the analysis of the lesson and can constitute milestones in the feedback on the lesson and in the processes of the improvement of the lesson.

Another role of the instructor is to lead the teachers to plan a quality lesson in which there are the five components of mathematical skills. A quality lesson addresses all five of the components of mathematical skills, which rely on high order thinking and are inseparable.

Mathematical expertise is entwined from the following abilities (Kilpatrick, Swafford, & Findell, 2001).

- Conceptual understanding: Perception of mathematical concepts, actions, and relations.
- Procedural understanding: The skill for the identification of a suitable procedure, flexibility, precision, efficiency, and adjustment.
- Strategic ability: The ability to adjust a mathematical structure, to represent, and to solve mathematical problems.
- Ability to suit explanations: Skill in logical thinking, reflection, explanations, and justifications.
- Creation of structures (arrangements): Practices to see mathematics in a logical, useful, and effective manner, integrated with the belief in the ability of every person to do mathematics.

The instruction in lesson study focuses from the stage of the planning and implementation of the lesson. Or in other words, when students receive the main

mathematical task of the lesson, they must understand precisely the problem and formulate the task they must solve, they need to be able to explain their ideas to the students and to the teacher. Therefore, even if the main goal of the lesson is to acquire a certain concept or to develop a certain procedure, the teachers must see that the way in which they connect with the students during the lesson will influence the development of the ability of analysis and synthesis, development of the ability of explanation and justification and belief in the ability of every student to solve mathematical problems. Attention to all five of the components is a challenge for the instructor of lesson study in the process, and it is important that the teachers will think about all the components when they plan the lesson.

The instruction in lesson study is helped by the planning of the lesson and focuses on the following principles:

- Continuum of the learning and the place of the lesson on the continuum: In the mathematics lesson the unity of learning is linked to many different ideas. Every new mathematical idea must be built on previous knowledge and must lead to additional ideas. The instructor must help the teacher to examine the ideological surrounding contexts of the topic and the construction of the ideas on the learning continuum that includes the years of learning and to identify the specific role of the unit learned in these contexts. He must cause the teacher to ask the following questions. What did my students learn already that is relevant to the topic learned now? What will the students learn in the continuation and how will their knowledge be built on the basis of what they learn now? These questions will help the teacher understand the place of the specific topic in the curriculum and in the comprehensive lesson plan of mathematics.
- Presentation of the lesson goal. The instructor gives the teacher tools for the setting of the goal of the lesson, which needs to focus on what the student is expected to understand after the lesson.
- Finding problems or meaningful tasks: The instructor presents to the teacher the principles in the choice of the problem or task that will be presented at the start of the lesson, so as to help the students develop the understanding presented in the goal of

the lesson. This principle leads the teacher to feel the students' curiosity and to use the factor of surprise, which is every effective in the creation of interest and questions among children (Takahashi & McDougal, 2016).

- Presentation of the problem to the students. An important component in the planning of the lesson is thinking about how the problem is presented to students. This thinking is beyond the question of how it is necessary to formulate the problem, which is also an important factor that needs to be taken into consideration. The thinking is far more complex – does the problem need to be presented also using a visual representation? Is an illustration of the problem or numerical examples necessary to clarify the situation? Do the students need to be partners in the creation of the examples? How will the students use a variety of representations to understand the problem and will they be able to solve it? What will be the influence on the students' learning? When a teacher is thinking about a problem she will present to the students, she must think about the ways in which the student will act to think about the problem and to attempt to find its solution. The task presented to the students at the start of the lesson is supposed to lead the students to a new understanding, an understanding that will be achievable by all the students. Therefore, the task needs to be such that it will provide many ways for solution and will have many elements that can be discussed. It is important that the teacher solve the question, which she intends to present in the classroom in many different ways. The instructor attempts to hypothesize with the teacher colleagues how the students will solve the task and helps the teacher in the mathematical discussion of the lesson and in the construction of the required idea.
- Choice of learning aids. Learning aids used in the lesson need to help the students create an image for the abstract mathematical concepts. The instructor advises the teacher on the use of the aid and clarifies along with her how the use of the aid will influence the students' thinking when facing the goals of the lesson.
- Asking appropriate questions in the lesson. The instructor helps the teacher ask the right questions. When planning the lesson the teacher needs to think about the key questions that will direct the development of the students' thinking. Some of the

questions need to help the students think about the thinking (perform reflection) and some to evaluate and summarize what they learned in the lesson. The role of the questions is to direct the students, to bring to the awareness previous attempts and experiences, to verbalize and link their previous attempts and experiences with the problem of the lesson. These associations are meaningful in the construction of new knowledge.

- Organization of the learners for the purpose of the discussion of the ideas. The instructor helps the teacher in the planning of the lesson how to organize the students, at different points of time in the lesson, so as to discuss their ideas and to collect the ideas to formulate a general idea and generalization. When the teacher thinks about the organization of the learning in the lesson, she needs to balance cautiously between the need of every student to think individually and to attempt to solve the problem together and the need to exchange ideas with friends.
- Expectations from the lesson and preparation for students' difficulties. The instructor enables the teacher to identify the students' mistaken perceptions (learning mathematics is filled with challenges and difficulties). Anticipation of difficulties is an important component in the planning of the lesson. The goal is not always to prevent the mistake – discussion of the special difficulty or mistake can be a factor that invites meaningful learning. In any event, as the teacher expects ahead of time a number of ways of solution to be raised by the students in the class, she can handle the difficulties more effectively (Isoda, Stephens, Ohara, & Miyakawa, 2007)

Another meaningful role of the instruction is the lesson assessment. The instructor observes the lesson, provides feedback, and evaluates, while he develops in the peers skills of self-assessment and reflection (Fujii, 2016). Assessment is a tool that accompanies the instructor in the process of lesson study. It plays a central part before, during, and after every lesson. The assessment needs to be an integral part of the planning of the lesson of the instructor and the teacher.

In the planning of the lesson, it is necessary to use the evaluation of the students' degree of understanding of the tasks and evaluation of the coping with the tasks by the

students. The teacher needs to consistently evaluate the degree to which the students understood and the questions that can direct them to raise their level of understanding.

When the lesson ends, the teacher needs to create ways to evaluate the students' understanding. This evaluation will direct her to emphases to be placed in the following lesson. When the teacher analyzes the lesson, she needs to cautiously take into account what the students understood in the lesson and what was the factor that created their understanding or did not create their understanding. The assumption is that effective lessons are only those based on the evaluation of the results. The instructor enables the colleagues who were present in the lesson to be capable of presenting specific examples from the lesson to support their questions and the instructor needs to be capable of presenting examples from the lesson that will justify the arguments that will be raised so as to defend the teacher's decisions (Dudley, 2011; Glencoe McGraw Hill, 2010).

Summary

The lesson study model represents a spiral process of continuous and collaborative professional development, which was developed for teaching staffs in Japan. This process offers possibilities for the improvement of the teaching with emphasis on the learning processes in the classroom. Lesson study enables the staff to act together and to examine, research, and methodically improve the ways of teaching.

According to the lesson study model, quality teaching is the implementation of intellectual requirements and not the implementation of a collection of skills. The lesson study model focuses on the conceptual understanding of mathematical concepts and the building of association required for the in-depth understanding of the mathematical ideas. It engages in the everyday actions in the teacher's work and represents the routine work in a fascinating, multifaceted, and complex light. It enables the teachers to have a renewed meeting with the beauty of the profession and with the difference between the students and focuses the understanding that there are no simple solutions and that only with joint forces is it possible to advance – not necessarily with the help of current technological skills.

A unique aspect of lesson study that differentiates it from professional development in other ways is that the observed and researched lesson puts the teaching practice to the test of reality and connects between theory and practice. The teachers can take their ideas into the classroom and examine them in a practical and methodical manner.

The lesson study is accompanied by the leader of the learning community, whose guidance contributes greatly to the development of the teachers' expertise in professional, pedagogical, and didactic terms and thus there is a change. The instructor acts in three main dimensions: functional-professional, socio-psychological, and assessment, reflection, and feedback.

Summary

The review of the literature presented in the first four chapters opens with the presentation of the needs of **professional development** in the schools as learning organizations in the 21st century. The understanding is that the development of human capital is performed both on the personal level and on the professional level, and the aim is to improve the abilities that will be expressed in the students' achievements. Alongside the individual work of each teacher in the classroom, a culture of collaborative professionalism develops in the learning community, which in parallel nurtures the teachers and is nurtured by them.

The integration between the learning and the structuring of the knowledge addressed by the teachers in the professional community, which for them constitutes a supportive development environment, creates great reciprocal commitment, encourages mastery and activeness of the teachers, and enables focused learning. A professional learning community equips the teachers with the tools for re-thinking, invites cognitive freedom, and enables the adoption of teaching practices and approaches in the spirit of the time, from an experience of involvement.

The second chapter of the review describes the strength of the **professional learning community** in the improvement of the ways of teaching and knowledge used by it in this knowledge domain, while encouraging openness, initiative, and experience. The community members develop strategies and structures for collaborative learning, and although their main occupation is in knowledge, the social framework and the joint experiences are what establish their professional identity and give them a feeling of meaning and satisfaction. The community supports the coping with challenges, and because of it the members enjoy lifelong learning in practice.

This part further presents important characteristics of professional learning communities, including reflective dialogue, research of practice, and feedback and learning based on data and assessment. The chapter emphasizes the importance of the instructor-leader who is at the head of the professional community and engages in the accompaniment

of the team processes of learning, in personal accompaniment, and in the development of leadership.

The contribution of the learning community is most significant and is apparent in the constant improvement in skills, in up-to-date knowledge, and in the teachers' sense of efficacy to bring their students to achievements. The teachers receive recognition of the importance of the authentic knowledge they bring and they lead the learning process, and thus a community grows in which they are both students and leaders. The community work entails challenges such as differences of opinion and competitiveness and requires the assimilation of the understanding that this is a long process that necessitates time resources and mental availability.

The third chapter of the review of the literature describes **peer learning** as a long-term guided framework intended for people with a professional content, or functional common denominator. The aim is to improve the ways of teaching and to encourage intellectual growth in the content field. Peer learning relies on the perception that learning is an interactive process of the formation of new knowledge through the transformation of experience. The characteristics of peer learning include pedagogical discourse that invites the multiplicity of opinions, joint work on everyday tasks, and motivation of learning processes.

The peers research professional issues and their experiences in their role, learn from one another, and develop supportive relationships. They even examine themselves through the way in which they are perceived by their group members. The fact that every peer contributes to the learning and benefits from it strengthens the participants and encourages them to activity. Research studies indicate the prominent advantages of peer learning, including the building of more supportive teams and relations, communication, improved self-esteem, and higher productivity.

The fourth chapter of the review presents the **lesson inquiry model** as a process of continuous and collaborative professional development, at the center of which there is quality teaching that derives from the implementation of intellectual requirements. This process contributes to the improvement of the teaching through emphasis of the processes

of learning in the class and enables the staff to examine, research, and improve the teaching methods in a methodical manner.

The model engages in the everyday and routine actions in the teacher's work and presents them in a fascinating, multifaceted, and complex light. It enables the teachers a new and refreshing encounter with the profession, different among the students, and focuses the understanding that there are no simple answers and that only through joint forces (not necessarily technological) is it possible to advance. The uniqueness of the lesson inquiry lies in that it puts the teaching practice to the test of reality and connects between theory and practice; the teachers can take the insights and ideas to the class and examine them in practice.

The lesson study is accompanied by the leader of the learning community, who acts in three main dimensions – functional-professional, socio-psychological, and evaluative. Therefore, it causes a change and contributes greatly to the development of the teachers' expertise – professionally, pedagogically, and didactically.

Chapter V: Research Methodology

This chapter addresses the methodology chosen for the present research study, from the stage of the planning, through the choice of the research approach and research instruments, to the manner of performance of the research. I will begin with the presentation of the research and will describe my research approach, the paradigm chosen for the research, the research method, and the research genre. Then I will note the characteristics of the qualitative research method and of grounded theory and the explanations in favor of this method in the framework of the present research study. In the continuation, I will describe the research process, which includes the research field and the research environment, the research instruments, the research participants, the description of the interviews, and the considerations of ethics. In this chapter I will describe the intersubjective relations between the researcher and the interviewees, and last I will discuss the validity and the reliability in the research.

This research study addressed the issue of the professional development of teachers and focuses on the model of peer learning in mathematics lessons in elementary schools according to the model of lesson study (Hiebert & Grouws, 2007). This research study examined the processes of teaching according to a model of peer learning in a professional learning community, so as to influence the professional development of the teachers in the school and improve the students' achievements.

This research study enabled the construction of a model of professional development different from the classic model, a model that focuses on the giving of information by an outside expert. The aim of this model is to train the teachers to work in a changing and unexpected environment, to provide them with additional instruments for their professional development, and to aspire to help them learn, speak about their experiences in the classroom, respect their practical knowledge, and share their knowledge and experience with one another.

The model enables the teachers to have control over the process of teaching and constitutes a part of the professional development and development of a culture of

partnership and willingness for activity. In this model the teacher is a partner in a professional learning community.

The teacher experienced a process of meaningful learning in teaching through lesson study both in personal and professional terms. This process is a process of the formative assessment of the teachers, assessment based on pedagogical discourse that is held before and after the lesson and is assimilated in the teacher's teaching method.

The research examined the implications of a different professional development model that is based on peer learning and includes practice, theory, and implementation as its starting point, so as to cultivate teachers with 21st century skills. The challenge is to create frameworks of professional learning communities based on the teachers' pedagogical experience from their insight. The communities of learners exist in the schools as a part of the improvement of the teaching process. The quality of the effectiveness of learning communities is the sharing of knowledge and accumulated experience through the creation of reciprocal trust as a means for the enrichment of processes of teaching, response, and evaluation.

In this work the researcher sought to understand the ways of teaching of teachers who do not cooperate with one another. Some of the teachers who participate in the community are not licensed to teach mathematics and the staff participating in the school meetings does not discuss the teachers' teaching methods. In other words, all the teachers work alone in their classes.

For this reason, the researcher chose to identify processes of teaching and learning in the professional development of teachers and to examine the influences of peer learning in the professional learning community in the mathematics lessons according to the model of lesson study (Hiebert & Grouws, 2007). As an educator, a mathematics teacher, and an instructor in the Ministry of Education, I consider it important to instruct and to lead teachers to meaningful learning and work. As an instructor, I believe in peer learning in the community in general and think that this process is a dominant component in the teacher's professional development.

Peer learning in the professional learning community may significantly influence the processes of learning, teaching, and evaluation in the mathematics lessons and may enable teachers and students to experience meaningful learning both personally and professionally. From a personal perspective, the research examined whether peer learning leads to higher motivation towards the teaching profession, personal satisfaction, feeling of efficacy, and self-fulfillment. From a professional perspective, the research examined whether peer learning in mathematics enabled the use of a variety of creative ways of teaching and provided tools for giving feedback to peers and receiving feedback from them.

5.1 Research Objective and Research Questions

5.1.1 Research Objective

1. To identify the processes of teaching and learning that contribute to the knowledge and professional skills of the teachers in the framework of a professional learning community.
2. To examine the influences of peer learning in the professional learning community in the mathematics lessons in the elementary schools according to the model of lesson study on the teachers' professional and personal development.

5.1.2 Research Questions

1. Which processes of teaching and learning in the professional community improve the teaching practices?
2. What are the characteristics of peer learning in the cultivation of pedagogical discourse following the lesson study?
3. How do the characteristics of peer learning influence the professional development of the teachers in the professional learning community?
4. How do the characteristics of peer learning influence the personal development of the teachers in the professional learning community?

5.2 Research Approach

In the process of the formation of the research study according to the suggestion of the adviser to the work, it was decided to perform a **qualitative research**, or in other words, it was decided that the methodology of the present research study would be “the collection of techniques for the purpose of the presentation of questions and thinking about human activity as a social phenomenon, performance of observations on the phenomenon, and development of conclusions on the basis of empirical evidence, all through other ways than measurement and statistical analysis of relations between variables” (Thomas & James, 2006, p. 790).

Denzin and Lincoln (2000a, p. 3) defined qualitative research as “situational activity that offers a viewpoint to one who looks at the world, namely, qualitative researchers research things in their natural place, and attempt to find meaning in the phenomena or interpret them in terms that people use”.

Another definition that overlaps in part with the above definition was proposed by Maykut and Morehouse (1994, p. 2). “Qualitative research, on the other hand, generally examines people’s words and actions in narrative or descriptive ways more closely representing the situation as experienced by participants”.

In qualitative research, the process is spiral. The research begins with the choice of the topic, from which research questions are defined and then the data are collected. In the qualitative process the data processing is undertaken through analysis of the content collected and not through statistical methods (Creswell & Plano Clark, 2007).

In qualitative research open-ended instruments are used, such as observations and open-ended interviews (interviews with open-ended questions). The processing of the data is through content analysis, or in other words, the attempt to interpret what is said in the social context (such as body language, tones of speech, and so on) (Denzin & Lincoln, 2008).

The structure of the research study is inductive. The researcher does not seek to confirm or refute preset hypotheses, but rather to form a perception on the basis of cumulative data, when the theory is built on the basis of evidence. Therefore, this qualitative research forms constantly the theory found frequently in a process of formation and cohesion.

The adoption of an inductive process in the research reduces and even prevents the hasty and one-dimensional drawing of conclusions based on belief or partial experience but rather encourages the researcher to look at the research environment – the community of learners – and to learn it from a perception that this is a dynamic system, complicated in social terms, diverse, and sometimes unexpected.

According to Znaniecki (1958), the group of participants in the present research study represents modern society, which is composed of small groups whose members hold personal reciprocal relationships. According to Znaniecki, this group cannot connect all the individual's interests, since each one has a limited field and personal specialization. Therefore, it is not possible to unite the social personality character of the group members into a common interest. As aforementioned, the individuals in the group must have a constant and stable character so that society can satisfy all its components. In such a case, it is possible to achieve a united group with different interests. Examples are found between the professional types, such as schools, military service, and administrative service. These organizations tend to influence the manner of the participants in them strongly enough so as to create types whose basic characteristics are similar in all societies. The groups of occupation tend more and more to distance from their field of interests anything not directly related to "their business".

This research study was conducted in the spirit of the constructivist paradigm that does not search for causal explanations of phenomena but rather searches for processes of the creation of meaning of the participants' world (Sabar-Ben Yehoshua, 2001). The experience of reality and the world of experiences, as they are experienced by the participants, are interpreted in a controlled and reflected manner by the researcher (Shlasky & Arieli, 2001, in Sabar-Ben Yehoshua, 2001).

The human personality is the basis for the causal explanation of social occurrences. When it is perceived as a product of social evolution, it can be causally explained by social occurrences. In the first case, the personal reference to social values serves to explain the appearance of new social values, while in the second case, social values that act on existing personal attitudes serve to explain the appearance of new individual attitudes (Znaniecki, 1958).

Constructivism is a philosophical viewpoint on our understanding and knowledge of things. At its center there is the idea that the learner builds his knowledge from his experience. The research was based on basic assumptions of constructivism, in which the understanding is found in interaction with the environment. The motive of learning is cognitive conflict. The building of the knowledge is created through social dialogue, in which the teachers examine their personal knowledge and experience versus the social conventions and the shared public knowledge (Dreyfoos, 1989).

At the basis of the supra-methodologies focused on the participants there is the constructivist-interpretative paradigm (Shkedi, 2011). According to this paradigm, the reality is built through the interpretation of people who experience it. Therefore, the reality is perceived as subjective and relative, and not as a real objective entity (Shkedi, 2003). The perception of this subjective interpretative reality obligates naturalist (Denzin & Lincoln, 2011) and holistic (Patton, 2002) reference to the phenomena. The holistic reference to the phenomena means the understanding of the reality “as a whole entity when all its components are entwined and hold between them reciprocal relationships, when the context of the researched phenomenon is not separate from the phenomenon itself” (Shkedi, 2011).

The research paradigm includes three components. The ontological question asks about the nature of the thing we want to know. It sees the reality as including all. The researcher thinks what she can know about the world and about the reality.

Epistemology is a branch of philosophy that researches the origin, nature, methods, and limitations of human knowledge. The epistemological question addresses the assumptions about the researcher’s ability to understand the researched world and hence

the question of the status of the knowledge of people. The question addresses every system of assumptions that the researcher holds and that pertain to the status of her knowledge. “How can we be certain that we know what we know?” On the epistemological question, it is impossible to separate between the researcher and the researched phenomenon and to present an objective position towards this phenomenon (Guba & Lincoln, 1998).

Regarding this research study, the question is: what is the place of the researcher in the research story? The researcher is an inseparable part of the community of learners and what she sees shapes what she defines and analyzes (Shkedi, 2003, p. 27). The researcher is close to their world and culture and obtains a perspective of “indwelling”. In qualitative research the researcher is required to have cognitive flexibility according to the data observed from the field (Givton, 2001). The researcher attempts to understand the situation from attention to the many data and without forcing pre-existing understandings on the research conditions (Merriam, 1998; Seidel & Kelle, 1995).

The methodological question examines “what are the ways to find knowledge”. The methodology is all the principles, methods of action, laws, and assumptions upon which the research study is based (Denzin & Lincoln, 2000b; Shkedi, 2003).

Qualitative research assumes that the way with the greatest empowerment to understand people is to observe, to speak, to listen, and to participate with them in their natural environment. The interviewees in the present research study have a number of characteristics that make them suitable for the research objectives. This research study is interested in the process no less than in the result, and therefore the number of participants is relatively low. It should be emphasized that the number of participants in qualitative-constructivist research is too low to generalize the findings to broader populations (Guba & Lincoln, 1998).

This perception enabled the entrance into the research without a clear and defined theory; rather the theory is built as a result of the study from the learning on the way in which the participants experienced the discussions following the lesson study in the process that occurred in an authentic and complicated environment in which the whole situation is analyzed.

This research approach enabled the delineation of a broad and authentic picture, reliable and trustworthy, of the reality, the events, and the phenomena, as they existed in the community of the learners. This approach encouraged the researcher to ask significant questions and to search for reliable answers to these questions.

The research enabled the researcher to identify the characteristics of peer learning in pedagogical discourse, the ways of teaching and learning, and the professional development of the teacher in the professional learning community. The research enabled the researcher to go into depth in the different influences of the peer learning on the teachers' professional development.

The present research study is anchored in grounded theory. Grounded theory is a process of content analysis based on the research method that was developed by Glaser and Strauss (1967). This theory proposes that the process of the structuring of the theory will be “grounded in the field”, or namely, it addresses theories built on the basis of understanding and interpretation of events that occur in the research field. The uniqueness of this method in the process of analysis grounded in the data were collected and analyzed in a methodical manner based on the analysis of categories (Givton, 2001). Some of the categories grow from the findings and are defined as *etic*, and some of the categories are external and grow from the research studies and from theoretical concepts and are defined as *emic* (Strauss & Corbin, 1990).

In the grounded theory approach, information is collected on the participants' patterns of life and the organizational structure of the professional learning community through basing on the assumption that constructivism is a theory that explains how knowledge is acquired on the world. According to this theory, learning is not a passive process and the contributions of the “learner” are not less than the contributions of the “teacher”. The guiding principle of this theory is that learning is performed during a process of activity, in the way of the structuring of knowledge. The fundamental assumptions that characterize the constructivist approach are that there is no existence for the knowledge in disconnection from the knower, learning is a structured activity, learning is an activity focused on a relationship and learning is a social activity (Shlasky & Arieli, 2001).

Since grounded theory is a paradigmatic starting point for the qualitative methodology (Givton, 2001), it is necessary to not be satisfied with the method presented as it is but to define also the genre in it.

Ethnography is accepted in qualitative research in the social sciences. It originates in the anthropologist's work methods and it constitutes a way to describe and interpret social phenomena without relying on quantitative tools and probabilistic relationships between variables. Its goal is to learn about the behavior of the group with a shared culture (Bar Shalom, 2011).

The word "ethnography" means a picture of a "way of life" of a group that can be identified. The ethnographer is always interested in the context and seeks to bring up the complexity of the research environment or the discussed problem. The material that the researcher collects becomes ethnographic in the process of writing, more than in the fieldwork (Shagrir, 2015).

The anthropological (ethnographic) research is an attempt to document and understand the culture of a certain society. The research engages in the documentation and interpretation of cultures. Instead of researching people, ethnography learns from people. Ethnographic research is suitable when we are interested in learning about the behavior of a group with a shared culture. The researcher observes the behavior and learns the meaning and the interactions between the different factors. The researcher observes, documents, asks questions, and addresses what people say, the way in which they behave, and the objects that they use (Karnieli, 2008).

Znaniecki (1958) notes that a group that brings all stable order into the experience requires continuous reflection, since it is impossible even to understand whether a certain experience is new in social terms or old without interpreting consciously the given content. A social environment never will be as stable as a physical environment. Social situations will not recur spontaneously; every situation is new, more or less, since each one of them includes different human activities. The individual does not passively find prepared situations that are similar to previous situation; he must define consciously every situation that is similar to certain situations if he wants to implement an identical solution. This is

what society expects the individual to do when he requires of it stable life organization; it does not want him to respond instinctively in the same way to the same material conditions but to build similar social situations reflectively, even if the material conditions change. The uniformity of behavior that it tends to assign to the individual is not uniform of organic practices but of conscious rules.

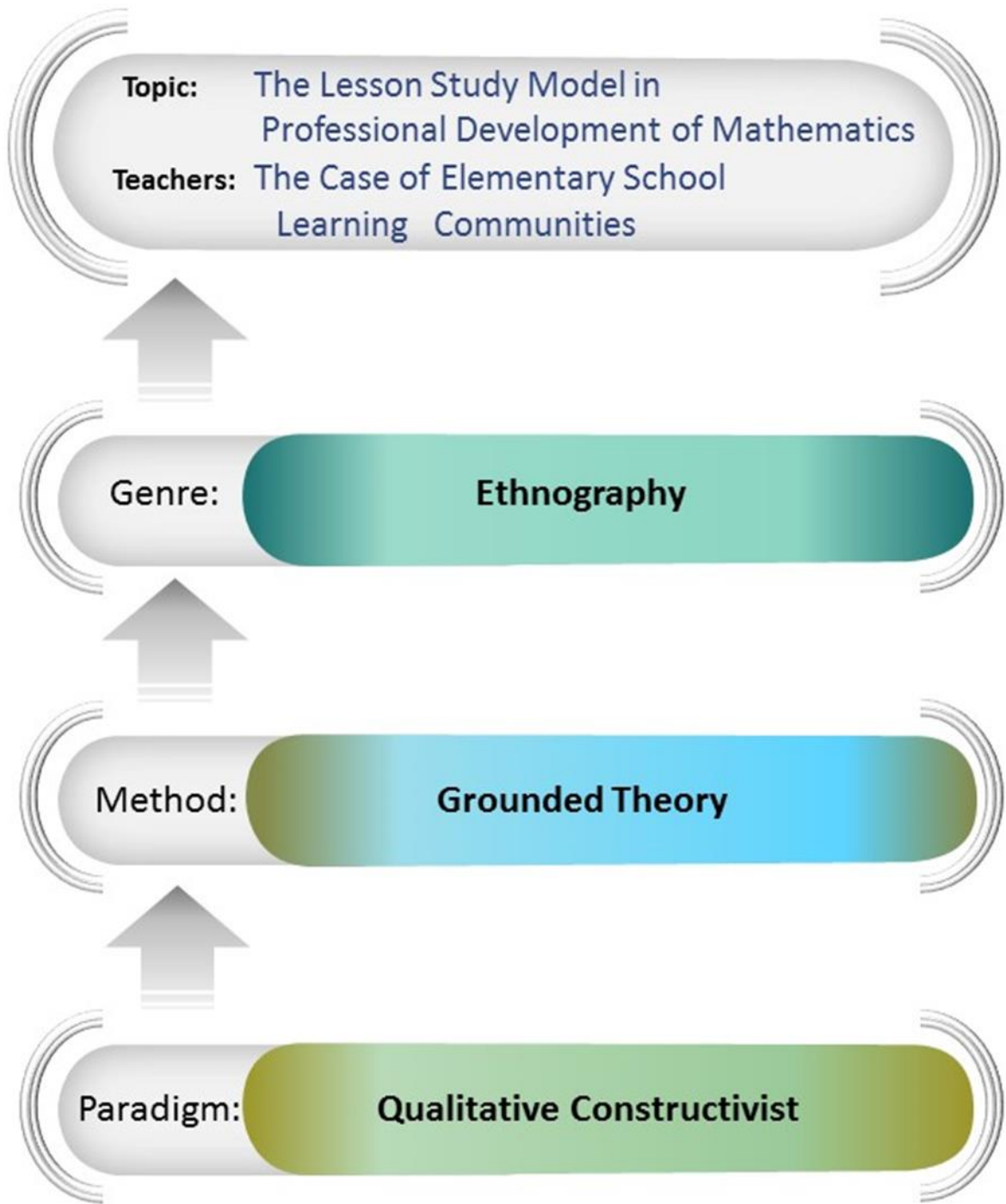
In this research study, the researcher chose this genre since she sees the educational system as a microcosm of broader society. It constitutes a natural arena of a system of life, in which there is a world rich in occurrences. This is a system of structure in which there is a unique local culture that includes values, division of roles, patterns of learning and behavior, and so on. To better understand the conditions required for the optimal existence of any educational system, it is important to research and learn it according to its culture and unique characteristics.

In addition, ethnographic research is a scientific way to understand human phenomena that occur in reality from the participants' perspective. It goes in depth in a holistic, comprehensive, and authentic approach towards the different phenomena among the teachers in the professional learning community.

In the research environment, it is possible to identify a participatory culture. The research examined whether in this culture a different discourse develops that has influence on the partners' professional development and ways of teaching-learning in the classes.

Figure Number 3

The Methodological Model of the Present Research



The research process was based on the faithful description of the reality (naturalistic approach), which fits with the 'laws of nature', the natural environment, and is performed at the site of the occurrences. The education institutions are the natural field of the everyday activity. The researcher has the ability to look inwards, into the social and scholastic life of the students and the teachers in the place of the occurrence, during the natural everyday activities.

5.3 Place of the Researcher

In qualitative research, "the person is the research instrument" (Lincoln & Guba, 1985). The researcher goes to the field to examine an issue that occurs in a specific time and place, according to his subjective interpretation. The researcher wears different caps in the process of the collection of the data, according to the way determined by him in the field and through the examination of the situation, and not ahead of time. Therefore, the researcher's presence in the field is considerable and prolonged.

The field enables the researcher to meet the interviewees and the data itself. The analysis of the results is performed by the researcher, through the division of the topic into categories, the examination of the topic, and the drawing of conclusions according to the researcher's personal perception. The method is not predefined; rather, the society that the researcher seeks to research, the organization, the phenomenon, or the event is what exists. Qualitative research assumes that human behavior is influenced significantly by the place where it occurs. Therefore, the researcher goes to the field and from all the possibilities chooses the research instruments that most suit the researched topic and acts in the field so as to collect data. The researcher relies on himself as a main research instrument for the collection and interpretation of the data (Spector-Marzel, 2010).

Znaniński (1958) maintains that it is possible to use the idea of individual life organization so as to indicate the existence of a limited and organized group of social groups, which compose a main part in life in society. It is necessary to remember especially that the fundamental problems of the synthesis of human persons are not problems of personal status but problems of personal location, since the ultimate question is what are the ways in which the character develops from a significant temperament in a certain life

organization. It is relatively simple to classify temperaments and characters, and this classification serves as preparation solely for the research of their evolution, when the goal is to determine types of people as dynamic types.

Like the personal life organization, we find in every society prepared models of organization that the individuals are expected to meet, but the analysis of these models does not constitute a research of people – but only their starting point. In other words, the concepts of temperament, character, life organization indicate only the starting point and the boundary of evolution, which is the true object – an issue of the research of the person’s personality. It becomes, therefore, a decisive point of importance for the definitions of the nature and organization of life, which can be used in the research of personal evolution.

According to Gilboa and Ben Simon (2010), the researcher “travels” between two main fields: (1) the field of the “collection” as a professional in the field and as a researcher and (2) the field of the “data” as a researcher and a professional.

In the present research study, I as the researcher was found in the education institutions, in the specific field I researched and I used all my senses to absorb the unique phenomena that occur in the community of learners and attempted to understand them. In the research process I identified the strengths and weaknesses of the teachers in the lesson study in a process that helped me decode the discourse and behaviors of the teachers in the research.

As a researcher, I belong to a culture of a professional learning community, and therefore I develop relations of trust, identification, and sensitivity to the issues of the participants, and I evaluate their emotions and cognitive tendencies. As a researcher, I was required to know intimately through observations and in-depth interviews the culture of the community. I identified sensitivity in my dual roles, on the one hand as an observer and on the other hand as a part of the community. This duality obligates me as an ethnographic researcher to move on the axis between visibility and invisibility and thus to examine the field in different perspectives so as to achieve insights about the research study. I was aware of the disadvantage in that I am involved in a professional learning community, the researched community. I understood that I must act in a reflective manner in the analysis

of the data, to stop and to think, to hold a conversation with myself, to process the events, and to be capable of examining them also as an observer from the outside (Edwards & Holland, 2013).

As a researcher, I saw considerable importance in the accumulation of meaningful knowledge following the participants' experiences in the peer learning in the community. In the process of the peer learning and in the interviews, I was required to learn the language and the culture. The lengthy stay in the community enabled me to do this.

5.4 Research Population

A total of twenty teachers who belong to a unique and closed group who teach in elementary schools in the center of Israel participated in the research study. The teachers were chosen to belong to a professional learning community in mathematics. They teach mathematics in their school in the first to the sixth grades. Some of them are homeroom teachers and some are subject teachers and some hold roles in the school, such as grade coordinator. The teachers were recommended by the school principal to be a part of the community.

The teachers in the community express characteristics as a representative source and as a source of differences. In the group there is difference in terms of gender, work experience, role, education, and professional development (See Table Number 1). The researcher instructed this community at a frequency of once a month for about four hours every session. The sessions were held in different schools in the city.

Table Number 1

Distribution of the Research Participants in the Professional Learning Community

Professional Development in the Past Three Years	Teaching Certificate for Mathematics	Position			Education		School Type		Gender		Years of Experience in Teaching
		Coordinator	Subject Teacher	Homeroom Teacher	Master	Bachelor	State Religious School	State School	Female	Male	
4	7	5	9	6	5	4	5	4	6	3	1-10
3	4	2	5	3	3	2	2	3	5	0	11-20
0	0	3	5	4	4	1	1	4	5	0	21-30
0	0	1	1	1	0	1	1	0	1	0	31-40

Table Number 2

Description of the Interviewees according to Gender, Age, and Teaching Experience

Research Alias	Gender	Age	Teaching Experience
SL	Female	44	22
ZA	Female	45	21
YB	Female	55	28
GG	Female	40	25
OG	Male	38	6
IL	Female	38	4
SR	Male	34	8
AI	Female	30	3
RT	Female	48	18
SS	Female	60	40
OS	Female	28	5
DH	Female	38	10
SB	Female	40	13
SH	Male	35	9
AF	Female	42	19
IV	Female	42	19
SA	Female	30	11
OL	Female	49	2
AE	Female	50	8
SM	Female	47	25

5.5 Research Instrument

The research questions were based on the use of in-depth interviews, which constituted the main source of information of the research study. The most important principle in qualitative research is that for the research to succeed there must be the real interest of the researcher in the people and in their stories. The interview is one of the common and prominent ways to understand people, their experiences, and the meaning they attribute to these experiences (Roulston, 2014). I chose in-depth structured interviews as a research instrument since the research objective was to investigate the topic from the interviewees' subjective perspective.

An interview is a conversation in which the interviewer asks the interviewee questions with the goal of collecting data during the documentation of the responses. The interview can be performed face-to-face or through media, and it is the product of interaction between the speaker and the listener. In the interview, we identify a process of the construction of reality that both sides contribute to and even are influenced from (Liamputtong, 2013). The interview enables the interviewee to describe things and events in a way that he perceives them and to move forwards and backwards in time: to reconstruct the past, to explain the present, and to anticipate the future (Morrow, 2005).

There are different types of interview: structured interview, semi-structured interview, and unstructured interview. In the present research study, I chose to use an in-depth structured interview since the professional learning community that I instruct began professional and social conversations with cooperation among the community members. My goal in the interview was to reveal the interviewees' perception and beliefs regarding the research questions that I am researching. In this research study, I assume that every teacher in the community is an entire world. As a researcher, it is difficult to predict the beliefs and opinions of the participants in the process that they are experiencing in the professional community. It was important to me to listen to each and every one separately and not to predict ahead of time what they will say. In addition, through this instrument it

is possible to see infinite complexity in the process the community is found and to identify cases it is not possible to reach in the everyday.

An in-depth interview is a conversation between two that invites the interviewee to tell things from his perspective. The interview has a structure but is not necessarily structured. The goal is to understand the interviewee's experience and the meaning the interviewee attributes to it. The materials that arise during the interview are from the interviewee's conscious and unconscious choice. Such an interview is characterized by open questions, in a semi-structured or unstructured format, by broad documentation, by recording, by the interviewer's listening and interpretation, clarity and understanding throughout the entire interview. In an in-depth interview, a uniform format was not created for the interviews. Rather, there is importance to the flexibility, adjustment, and internal dynamics occurring during the interview. The dialogue is renewed with every interviewee and receives its uniqueness. In this situation, considerable attention is required of the interviewer and attention to all nuances of the conversation, as well as to the interviewee's nonverbal expressions (King & Horrocks, 2010).

There are seven stages in the planning and performance of a research study based on the in-depth interview:

1. Thematising – What is the goal in the use of the interview in this research study? What do we attempt to achieve?
2. Designing – The preparation of a guide of the interview, including page of details, questions, and lists.
3. Interviewing – The presentation of the researcher and the research to the interviewee, questions and answers according to the instructor, the interview through active listening, end of the interview.
4. Transcribing – The creation of the written text of the interview, the transcription and integration of other recordings.
5. Analyzing – The search for themes (topics, categories), similarity, and patterns, so as to give meaning to the information.
6. Verifying – The examination of the reliability of the analysis.

7. Reporting – The publication of the findings.

The advantages of the in-depth interview are expressed in the more profound understanding of attitudes and opinions between the interviewer and the interviewee. This creates relations of trust between them. The disadvantage of this type of interview is that the conversation is not focused and additional topics arise during the dialogue and it is hard to process them. In addition, it is necessary to preserve the trustworthiness of the findings because of the strong influence of the interviewer and the interviewee's personality (Jamshed, 2014).

5.5.1 Interview

The method for the collection of the data in this qualitative research is in-depth structured interviews. First I explained to the participants about the research, about the interview, about my areas of interest as a researcher, and about all other information.

I built an interview guide according to the research needs and characteristics, to be an aid in the building of the final interview. The interview guide has three parts. The first part included background questions in which relevant sociodemographic details are noted, such as age, gender, years of experience, general education, mathematical education, and present role in the school. The second part consisted of the questions of the interview. The questions are divided into four main areas: the professional development of the teachers, the professional learning community, peer learning, and lesson study. In this interview, it is possible to indicate different types of comprehensive description questions that constitute a basis for the research. For example, “what are the contents that you acquired in the professional development activity in which you participated during the past year?” “How much did they positively influence your teaching?” “If you had to plan such a process for teachers in the coming year, then what would you adopt and what would you change?”

Focused descriptive questions are the direct continuation of the comprehensive descriptive questions and enable additional investigation of more limited aspects of the experiences, the interviews, and the opinions. For instance, “Tell about the processes that

were significant for you in the professional learning community.” “Note tools that you acquired in the process of the peer learning.”

Descriptive questions that invite examples address the action or specific event mentioned by the interviewees and seek to expand through examples. “How did your presence in this community contribute? Bring an example.” “Bring examples from the process of lesson study that left a mark on you.”

Experience questions ask the participants to describe experiences they had in a certain framework and to focus on their subjective experience and less on the outside event. “What did you feel at the end of every meeting of the professional learning community?” “How was this expressed in your work?” “Sharing is a main characteristic of the professional learning community. How is the sharing expressed in the processes of learning in the community?”

The third part included the researcher’s subjective facet, and in it at the end of the interview the feelings, interpretations, and remarks are written. The interview ended with the researcher’s inviting statement: “Are there any points we missed or points you think I need to know? Is there something that perhaps I did not understand correctly? Or would you like to add general comments that were not expressed in the interview?” (Shkedi 2003)

The in-depth structured interview in this research study is guided by the interview guide, which encompasses a number of content areas and key topics that derive from the research question and its derivatives. In the interview, I covered these areas with the interviewees. In this process, the order and the form in which these areas are examined depend on the way in which the interviewees bring up the topics that are meaningful for them.

The interview guide describes exactly what is going to happen in each stage in the interview process. The interview guide is supposed to provide a direction for the interview and the field it is covering. The interview guide is intended to remind the interviewer of

the topics about which it is important to ask questions. The interviewees are not to be compelled to go according to it.

The aim of the interview guide is to enable the comparison of the information between the different participants, to serve as a reminder, and to enable conceptual focus on the research topic. The interview guide gives the interviewer some flexibility for response to individual changes. It is necessary to return to the interview guide during the interview to examine whether all the topics in it were covered. It is necessary to adjust the interview to the interviewee and to the place (Josselson , 2015).

The interview guide was given to two teachers from the professional learning community. The interview was phrased in clear language so that the interview questions will be clear to the interviewees. Following the interviews, minimal changes were made to enable conceptual focus on the research topic. I changed the interview guide according to the interviews conducted in order to research in-depth topics that the interviewees experience as important and to enable the research of the interviewees' viewpoint and experience in their work in the field.

The changes in the construction of the interview were in questions that address the instructor's role in peer learning (see Appendix Number 3: The Interview Guide, Peer Learning, question number 4) and in the questions that addresses the insights and difficulties following the lesson study (see Appendix Number 3: The Interview Guide, Lesson Study, questions number 4). In light of the interview guide, I phrased two new questions. (See Appendix Number 4: The Interview).

5.6 Research Process

The research study was conducted in the framework of a learning community of mathematics teachers from secular and religious elementary schools in the city of Raanana. The community consists of twenty teachers and coordinators of mathematics who were chosen by the school principals to participate in the community. The community existed for one school year, from September 2017 to June 2018. The encounters were held once a

month for four hours each meeting. Every meeting was held in a different school in the city, so that the participants could know the work environment of the other community members.

The research study examined the nature of the meetings of the professional learning community and the nature of the peer learning in the mathematics lessons according to the model of lesson study. The researcher instructed the community. In the first stage, the researcher presented to the community members the outline of a pedagogical conversation following observation of the mathematics lesson (see Appendix Number 1: Pedagogical Conversation following the Observation of the Mathematics Lesson) during the analysis of the instrument and emphasis of the criteria for observation in the lesson. The community members experienced the outline in a workshop framework.

In every meeting, a teacher from the community conducted a lesson under the researcher's guidance according to the principles of the lesson study model in the process. In the meeting with the community, the researcher and the community members chose an issue for analysis of the lesson they observed. The issues were commensurate with the standards of the 21st century, such as conversation between the teacher and the student, use of teaching aids, lesson study, and so on.

Every teacher in the community is required to collect evidence from the observation in the lesson of the teacher who taught. The goal in this observation is to discuss the issue in principle that arises from it, in order to further the depth of the understanding in the processes of teaching and learning in the lesson. In this process, the teachers bring up explanations of this issue and suggestions for action or coping with the chosen issue. The teachers consider the advantages and disadvantages in ways of action. (See Appendix Number 1: Pedagogical Conversation following the Observation of the Mathematics Lesson.)

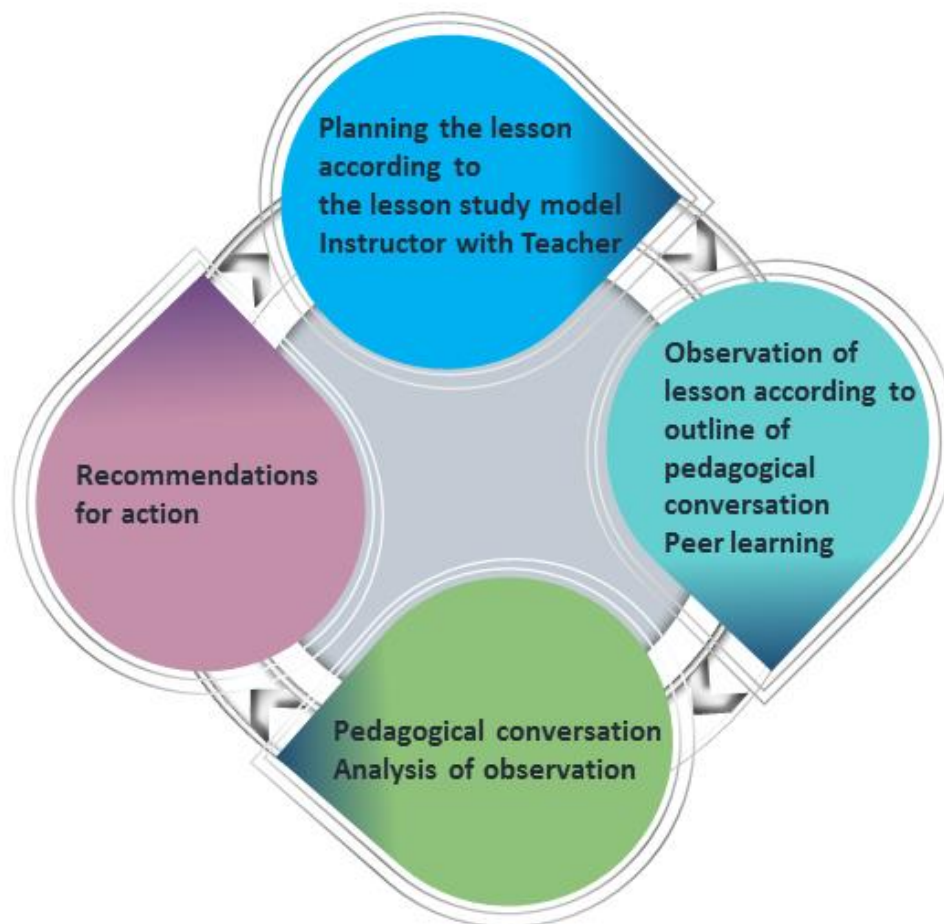
The instruction that the teachers received were as follows:

1. Document and analyze the documented conversation using the following dimensions.

2. Attempt to find quoted examples in the observation for each one of the measures: dimensions for the analysis of the conversation that describe the lesson using evidence.
3. Emphasize what was held in the lesson.
4. Ask the teacher questions of clarification in connection to the chosen issue.
5. Analysis the issue: causes and implications, with use of evidence.
6. Summary and reflection: “What did I gain from the conversation?”

Figure Number 4

Description of the Model of Pedagogical Conversation Following the Observation in the Lesson



After the lesson and the observation were held, the researcher conducted a pedagogical conversation with the members of the community. The conversation was based on the issue that was chosen, with emphasis on the questions of clarification that the community members asked the teacher who taught the lesson. The researcher managed the conversation, with use of the evidence from the lesson.

The teachers in the community suggested operative proposals for the teacher who taught the lesson. They addressed alternatives related to the issue and listed alternatives of action. Then every teacher in the community summarizes the insights from this lesson and the researcher conducted shared reflection of the entire process. The shared experience provided a framework on the basis of which the teachers built a supportive professional learning community. The pedagogical discourse provided an opportunity for the teachers in the community to think in-depth about the teaching of mathematics.

The teachers who participate in the research were interviewed by the researcher using an in-depth structured interview. (See Appendix Number 4: The Interview.) The interviews were held from the month of June after the last session. The interview lasted about an hour and a half.

Before the interview was held, I explained to the teachers of the community (the interviewees) the research objectives, the course of the interviews, and my obligations towards them, which include preservation of privacy and anonymity. During the interviews, I asked for the interviewees' permission to record the conversations. I read along with them the informed consent form for participation in the research study and made sure they signed it. (See Appendix Number 2: Informed Consent Form for Participation in the Research.)

The recording of the interviews contributed to the establishment of relations of trust with the participants, since it freed me from writing comments and consequently enabled me to focus more fully on the trust-building aspects of the interview in practice (Shkedi, 2011). During the interviews, I further implemented a number of trust-building steps. The

main step I adopted was the expression of empathy and participation in the experiences from my professional world (Segal & Marty, 2010).

At the end of the interviews, I adopted steps to maintain the relations of trust that were created between me and the interviewees. First, I attempted to make certain that the participants left the interviews with feelings of satisfaction and success. I thanked them for dedicating their time, and I emphasized their considerable contribution to the research. I conveyed to the participants the message that I am faithful to their perspective and am interested in representing them reliably (Karnieli, 2010).

5.7 Content Analysis: Grounded Theory

The process of the analysis of the data in the research study is the core of the research. The analysis is characterized as “an analytical process, generally not statistical, with intuitive elements or characteristics, the goal of which is to provide meaning, interpretation, and generalization of the researched phenomenon” (Givton, 2001).

Qualitative research “causes the meeting between the world of understandings researcher and the perception of the reality of the participants” (Hazan, 2001). In addition, qualitative research presents interpretation that is the basis for the partnership between different research paradigms and approaches of the non-positivist research.

The process of content analysis was based on the research method developed by Glaser and Strauss (1967) of grounded theory. The researchers in this method collect information on the patterns of life and on organizational and social structures, when the starting point is that there are social patterns that cannot be described in quantitative terms.

In this research study, the grounded theory is based on the model developed by Kassan and Krumer-Nevo (2010):

1. Stage 1. Holistic reading of the data. This stage includes the reading of the data as whole units that will lead to a process of analysis (emic). In this stage, the researcher goes over the material and identifies in it repetitions, or in other words themes,

topics, and titles that recur and that can be characterized or implemented. The themes that will be identified in the first stage will establish first categories and will serve as guides for the continuation of the process of the building of the research. The analysis and the first interpretation will be directed towards the additional participants.

2. Stage 2: Organization and reduction of the data. In this stage, the data were organized, so that it will be possible to focus on select aspects. The goal of this process is to facilitate the researcher's control of a large database. A more accurate definition of the categories is performed, when the category must indicate explicitly the unique contents that arose under this theme.
3. Stage 3: Breaking the data into small units. In this stage, the data is "disassembled" into small units and they are examined in-depth, sorted, and compared, to find similarity, difference, and contexts (Seidel & Kelle, 1995).

The process of the analysis of the interviews, called "coding", is conducted in three sequential stages:

1. Stage of open coding. In this stage, the first encounter of the researcher with the data occurs. Limited and localized "concepts" that constitute titles of names of the main topic found in every segment are noted.
2. Stage of axial coding. In this stage, the categories formed in the stage of open coding are relied on, with the constant improvement of the diagnosis of the recall of the data and their division into sub-categories. In this stage, the primary and secondary categories are identified, while finding the relationship between them according to the internal dynamics of the answers in the interview.
3. Stage of selective coding. In this stage, in essence the theory that arises from the data is created. From the database the core category that reflects the axis of occurrence that includes the axis of time and the axis of space is identified. The core category helps reach the high rank of generalization and simplification necessary to structure theory. The decision which category to choose is determined on the basis of the "theoretical sensitivity" (Strauss & Corbin, 1998) of the

researcher, who was attentive to her fundamental assumptions, to the research literature, and to the data.

During the research, there was a constant internal conversation between the researcher's theoretical and practical knowledge and the data and the patterns that were discovered in the interviews. The researcher is subject all the time in a situation of comparison between what arises from the investigation and her perceptions and she must take pains not to force her preliminary perceptions on the data.

5.8 Research Limitations

The research study has a number of limitations, which I as the researcher am obligated to address. These limitations pertain primarily to the possibility of the generalization of the research results of the professional development of teachers of mathematics using the lesson study model.

In this research study, the researcher is not "isolated", without ability to look at the teachers in the community. On the one hand, the researcher constitutes a part of the school system as an instructor of teachers, as a subject teacher, and as an instructor of the community, while on the other hand, the researcher constitutes an observer from the side who looks at the dynamic interaction between the researcher and the participants, so as to reveal processes and relationships or to create a basis for the formation of the hypotheses.

The researcher is an integral part of the process of the learning cycle that the teachers experience in the peer learning in the community, such as partnership in the planning of the lessons, in the observation, and in the pedagogical conversation after the lesson. The understandings of the researcher as well as of the interviewees are embedded in the social-cultural contexts in the community. While subjectivity and interpretation are the very essence of the methodology in this research study, as a researcher I am obligated to acknowledge this limitation.

There is the risk that the fact that I as the researcher initiated the change and led it will influence my interpretation of the data collected. To overcome this difficulty, I built an interview that largely is composed of open questions and the analysis was more reliable.

My involvement in the research study could also influence the functioning of the participants in that they would want to satisfy me and to voice the opinions and ideas they know I am striving to.

Another limitation lies in the scope of the research and in the demographic data of the research study. The research study included participants from a specific geographic region (center of the country), and it is likely that this research study does not reflect the population in Israel. In addition, the research included a majority of women, and it is possible that a research that will include a larger number of men would yield different results.

The research study included participants from eight schools in one city. It is possible that a research study that will include additional schools from other cities will yield different results.

5.8.1 Strengths and Weaknesses

My dilemma as a researcher was to decide upon the degree of my involvement in the occurrences in the learning community. On the one hand, I am a part of the community and an instructor in the community. This point constituted for me imbalance and objection that was expressed in my abilities to influence the processes in the community. On the other hand, I am perceived as threatening in the role of instruction, since I am serving as a school instructor of the Ministry of Education and I link between the school administration and the teachers.

This weakness can constitute a problem in the analysis of the findings and in the bias in the research. There is no doubt that the attention to the interviewees' reports is not

a simple matter. It is possible that some of the interviewees reflected the processes as they saw or they did not report situations that caused them discomfort.

My strength in this research study is expressed in that my being a part of the interviewee's professional world caused me to be perceived by them as one of the members of the community who is well immersed in the professional language, in the group processes, and in the group climate. Another strength can influence the research I am conducting that acted from a system viewpoint and understanding of the different factors in the educational system. My credo as an instructor is to create relations of trust, reciprocity, honesty, and attention.

As an instructor in the community, I am a part of a professional community of instructors of communities in which I learn theories, develop professionally, and acquire considerable knowledge that can influence the professional development of the community of learners.

5.9 Ethics in Qualitative Research

Qualitative research is built on two parallel systems of relations: the system of relations between the researcher and the participants and the system of relations between the researcher and the readers. This perception broadens the researcher's boundaries of responsibility and obligates the researcher to cope with dilemmas that deviate from the system of relations between the researcher and the participants. The research, which becomes a written text, is read and re-interpreted with each reading of it. The researcher, through her writing, places the foundations for the dialogue between the readers and the text and must do all she can to create conditions for a productive dialogue, which will influence the discourse in the field of her research. In this way, she fills her moral obligation towards her research participants, towards her readers, and towards the scientific community at large.

The research process entails ethical issues, one of which is to maintain research ethics. The upholding of ethics needs to be based on the "search for principles and qualities

that need to guide and characterize the appropriate behavior of the qualitative researcher” (Dushnik, 2011). The qualitative researcher is required to maintain the most basic moral principle – to protect the rights, dignity, and wellbeing of the interviewees.

The ethical issues that the present research study focuses on are: informed consent, non-exposure to danger, anonymity, dual role and excessive involvement, and the participants’ dignity.

1. Informed consent. The researcher must make certain that the research participants know about the research and are participating in it from their desire, understand the research characteristics, and the risks entailed by the process. It is necessary to give the participant detailed and clear information about the research goals and importance, and to present the discomfort that may be caused as a result of the participation in the research. It is accepted also that the explanatory words will explicitly state that the potential participant retains the full right to refuse to participate in the research and that he is entitled to realize this right during the research. The researcher must describe the explanation expected to be given to the participant for the purpose of the receiving of his consent, as well as the way to give the explanation (Gloshnekof & Ezer, 2012). In this research study, I informed all the interviewees in each and every stage, from the stage of the research goals and research importance to the way in which I interpreted the finding of the interview of the specific interviewee.
2. Non-exposure to danger. The researcher must make certain that the research participants will not be exposed to great danger from the expected benefit as a result of the research. The researcher has the responsibility to weigh the influences of the findings before they are published, so as to protect the participants from all harm that may derive from their participation in the research (Freyman-Levin, 2014). The danger to the participants in the research is not emotional but professional, because of the fact that the research instrument was based on personal interviews and there

was fear of the blurring of facts from the process that the interviewees experienced in the community.

3. Anonymity. The participants' identity must be protected, so as to preserve the interviewees from embarrassment or harm in light of the information. The requirements of anonymity and confidentiality are important to prevent the possibility of the exposure of the participant's information about his personal and professional matters, which may embarrass him or cause him damage or harm (Elkad-Lahman, 2012). The commitment to anonymity is expressed both in the process of the collection of the data and in the publication of the research report. After the transcription, it is necessary to adopt meticulous steps to preserve all the contents collected in the interviews and to store them in a locked drawer. The danger in this research study is the low degree of anonymity – the exposure of the identity of the participants in the community in the city where the research was performed.
4. The researcher has a dual role and excessive involvement. The researcher guides the community and is also a part of the group. She gives appropriate instruction to the members she instructs. In addition, she performs her actions with responsibility and ethically (Shlasky & Allpert, 2007). The danger to the participants is expressed in their unfair assessment.
5. The participants' dignity. It is necessary to address the participants with respect, sensitivity, and tact, to be accepting and not judgmental, and to act in cooperation with the interviewees (Sperling, 2016). In the present research study, the interviews were held in an atmosphere of sharing, under conditions of reciprocal respect, shared interest, attention, openness, and consideration. In every stage I was careful to clarify to the interviewees that their perceptions and attitudes had considerable value and significant contribution to the construction of a model for professional development of mathematics teachers and its assimilation.

5.10 Validity and Reliability

Qualitative research does not believe in uniform measurement instruments, and therefore it is necessary to aspire not to uniformity but to depth, which enables the achievement of the reality by the researcher. For the search for meaning, the researcher chose to use the term “perspective”, with reference to her world view. Qualitative research does not presume to argue objectivity and not even validity and reliability in the accepted sense in positivist research.

Lincoln and Guba (1985) proposed a key concept for the evaluation of the quality of qualitative and constructivist research – “trustworthy”. The question of trust in the present research study focuses on a number of issues. For example, “do we believe the report of the researcher?” “To what extent can we depend on the research results?” “Was the research study performed appropriately so that the findings are ‘trustworthy?’”

According to Lincoln & Guba (1985), credibility meets four conditions, as follows:

1. It is trustworthy: The researcher accurately reflects the outlooks and occurrences in the research.
2. It is transferable: It includes enough data so that it will be possible to compare it to other cases.
3. It is dependable: In other words, it is documented and it is possible follow up after the process.
4. It is confirmable: The findings are related to the data.

To fulfill these conditions, the qualitative researcher needs to stay long hours in the research field. In addition, the qualitative researcher must frequently observe people that she researches and discover patterns of behavior and phenomena that are discovered only over time. The researcher documents as fully as possible her findings and examines again the analysis of the data and the production of categories.

The basis for the determination of the **reliability** is the open exposure of the conceptual perspective and the criteria of the researcher. The collection of the data was

found in direct connection with the research questions (Shkedi, 2003). During the research, a database was created that includes recorded interviews and data of the stages of the analysis. This database enables the researcher, the colleagues, and the other readers to follow up after what was already done. Consequently, it is possible to examine the extent to which the researcher was faithful to the participants' interpretation and did force her interpretation on the data (Halabi, 2011).

The issue of the **validity** is called in qualitative research **credibility**. This is internal validity that focuses on the question of whether the researchers see what they think they see and whether it is possible to argue that a research argument is established since it has strong conceptual and empirical foundations. The meaning of validation is the transition back and forth between induction and deduction, between experience and reflection about the experience, between the data and our conceptual perspectives and our perspectives for conclusions (Leung, 2015). The ability of persuasion strengthens, when the theoretical arguments are supported by evidence from the informative explanations (Riessman, 1993).

The researcher chose to validate the research findings using the theoretical anchoring of the findings. The description included information about the context, appropriate quotes from interviewees, and open conceptual discussion. This description will allow the examination of the extent to which the arguments or the conclusions of the research study are convincing.

Another criterion in qualitative research is “**generalization**”, or “**transferability**”. This criterion is based on the question of to what extent is the theory applicable in other circumstances, or in other words, can be transferred. In qualitative constructivist research, the readers of the research study are the ones who determine the degree of generalization (Smith & Noble, 2014).

The researcher decided which aspects of the researched case can be implemented in other contexts. The researcher was obligated to rich descriptions of the research context, the background characteristics, and the researched phenomena so as to give the readers

sufficient information for the assessment of the correspondence between the researched situation and the situation they address.

In this research study, I chose to focus on interviews of members of the community. The interviews were performed in a sensitive and empathetic manner. I accurately and fully recorded what was said, and I presented quotes from the participants' statements that enable the production of meaning and the understanding of the researched phenomena. In the literature this issue is called "thick description" (Shlasky & Allpert, 2007).

To conclude, in the present research study there was reciprocal action between the researcher and the participants and the data. The researcher acted in three characteristics: ability of analysis, theoretical sensitivity, and sensitivity to the nuances of the phenomenon and reciprocal relations. The researcher took pains to listen greatly to the participants, to be sensitive to what hides behind their words, to realize the material in the interviews, to be open to the data, and to persevere in the continuous conversation with the data.

The researcher maintained ethics in the research. The participants revealed themselves to her. The researcher acted with great sensitivity and discretion during the interview.

Chapter VI: Analysis of the Findings

6.1 Preface

This chapter presents the findings of the research study that examined the influences of peer learning in the professional learning community in the mathematics lessons in elementary schools according to the model of lesson study in process. The research study identified processes of teaching and learning as a part of the professional and personal development of the teachers in a professional learning community.

The chapter describes and analyzes the descriptions of the interviewees in the professional learning community during one year of studies from different aspects. This chapter presents three aspects of the professional learning community as a model of pedagogical innovation (see the following figure). The first aspect (section 3.3) addresses personal aspects that include emotional experiences and instrumental experiences. The second aspect (section 3.4) addresses professional aspects in the field of mathematics that include subject matter knowledge and pedagogical knowledge. The third aspect (section 3.5) addresses social aspects that include relationships and climate and norms in the community.

The three aspects proposed here are intertwined, but for the purpose of the analysis and understanding of each aspect I dedicate a section to each aspect. In addition, the chapter of the findings presents two additional issues, the instructor's role in the professional learning community (section 3.6) and the challenges the teachers face in the processes of teaching and learning in the community (section 3.7).

The data collected through twenty in-depth interviews allowed the activity in the community to be documented and a look at the behavior of the community and its characteristics as well as the professional and personal learning of the teachers to be obtained. The content analysis of the interviews opened a window to the processes that the participants in the community experienced: professional process, social process, and interpersonal process. The findings are the result of the analysis of a continuous

conversation, and they are presented through lengthy quotes in every category. This way of the presentation of the findings brings the interviewees to the center of the stage, so that the voice of each one of them will be heard. The interviewer's questions were removed from the quotes for the purpose of the bringing of the interviewees' descriptions on the ideological and verbal continuum. The quotes are not edited but are presented written as they were said originally, in spoken language and without the notation of the teacher's name. However, in certain cases the teachers' profile was presented in the quotes, such as teaching experience or role in the school.

6.2 Presentation of the Findings

The analysis of the research data indicated three supra-categories that constitute the organizing axis of the findings: personal aspects, professional aspects in the field of mathematics, and social aspects.

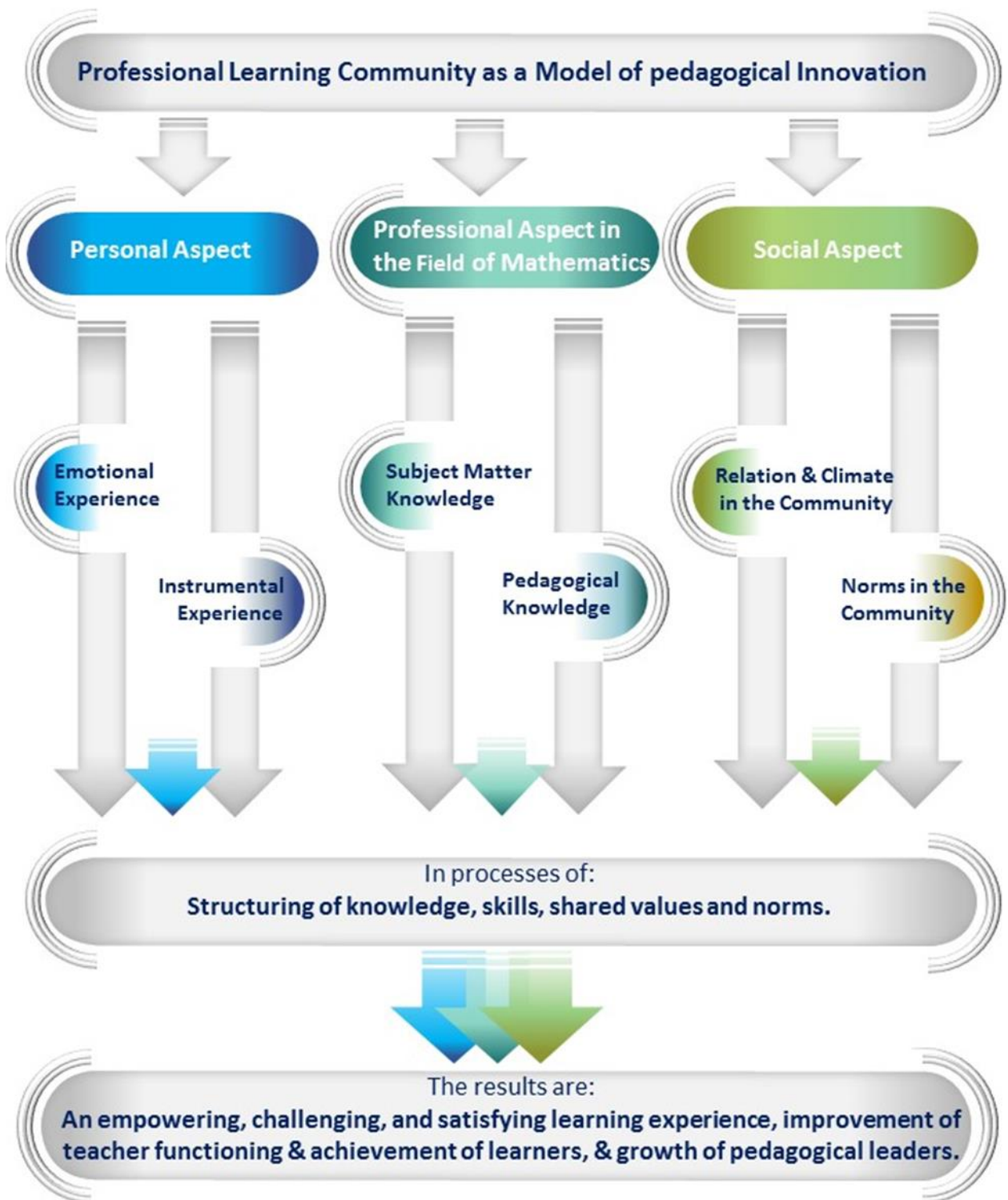
Personal aspects include emotional experiences and instrumental experiences that indicate the teacher's personal development and social involvement intended to cultivate her in the community. These experiences promote meaningful processes of learning in the learning community, including theoretical learning that enables professional development.

Professional aspects in the field of mathematics include the subject matter knowledge and the pedagogical content knowledge. The subject matter knowledge (SMK) includes in-depth knowledge of the content knowledge and it depends on the curriculum in mathematics, or in other words, the knowledge of the facts, concepts, structures, principles, manner of their organization, and relationships among them. Pedagogical Content Knowledge (PCK) is knowledge that is unique to the mathematics teachers and that develops during the teaching. It includes knowledge about the curriculum and core tasks in teaching, primarily the ability to translate theoretical knowledge into practical knowledge. This type of knowledge includes ways for the presentation of ideas in the content field, for instance, analogies and examples.

The social aspects include the patterns of the interpersonal relationships of the teachers who are participating in the professional learning community that are expressed explicitly and implicitly. The professional contents and the social aspects are intertwined and influence one another. They are an inseparable part of the teacher's perception of meaningful learning, which creates a combined fabric of cognitive, emotional, and social-value-oriented aspects. In the professional learning community, social aspects were identified from the interviews that were expressed in relations and climate that were created in the community and in the shared norms and values for all the community members. The community is a social framework in which the participants are found in communication with one another for the purpose of learning, construction of knowledge and interpersonal understanding with the involvement of those who come to the community.

The following figure on the professional learning community as a model of pedagogical innovation presents the personal aspects, the professional aspects in the field of mathematics, and the social aspects. This model arose from the grounded theory and explains that idea that innovation in education is implemented in the community life as an approach for learning focused on the development of personal, professional, and social competencies.

Figure Number 5
The Professional Learning Community as a Model of Innovation



6.3 Personal Aspects

Personal aspects include emotional experiences and instrumental experiences that indicate the teacher's personal development. In addition, they include also the social involvement intended to cultivate her in the community. Emotional and instrumental experiences enable the teacher in the professional learning community a sense of value, self-efficacy, and renewal, and they contribute to the responsibility and belonging to the community. These experiences offer the teacher opportunities to build knowledge in peer learning (Oplatka & Rosenblum, 2014). In the framework of this type of learning, the teacher builds her personal and value-oriented perception. This perception causes a sense of empowerment, high motivation, and ability of self-management. These experiences promote a process of meaningful learning in the professional learning community that includes theoretical learning that is accompanied by innovative activity.

The content analysis of the teachers' statements in the personal aspect led to two secondary categories: emotional experiences and instrumental experiences.

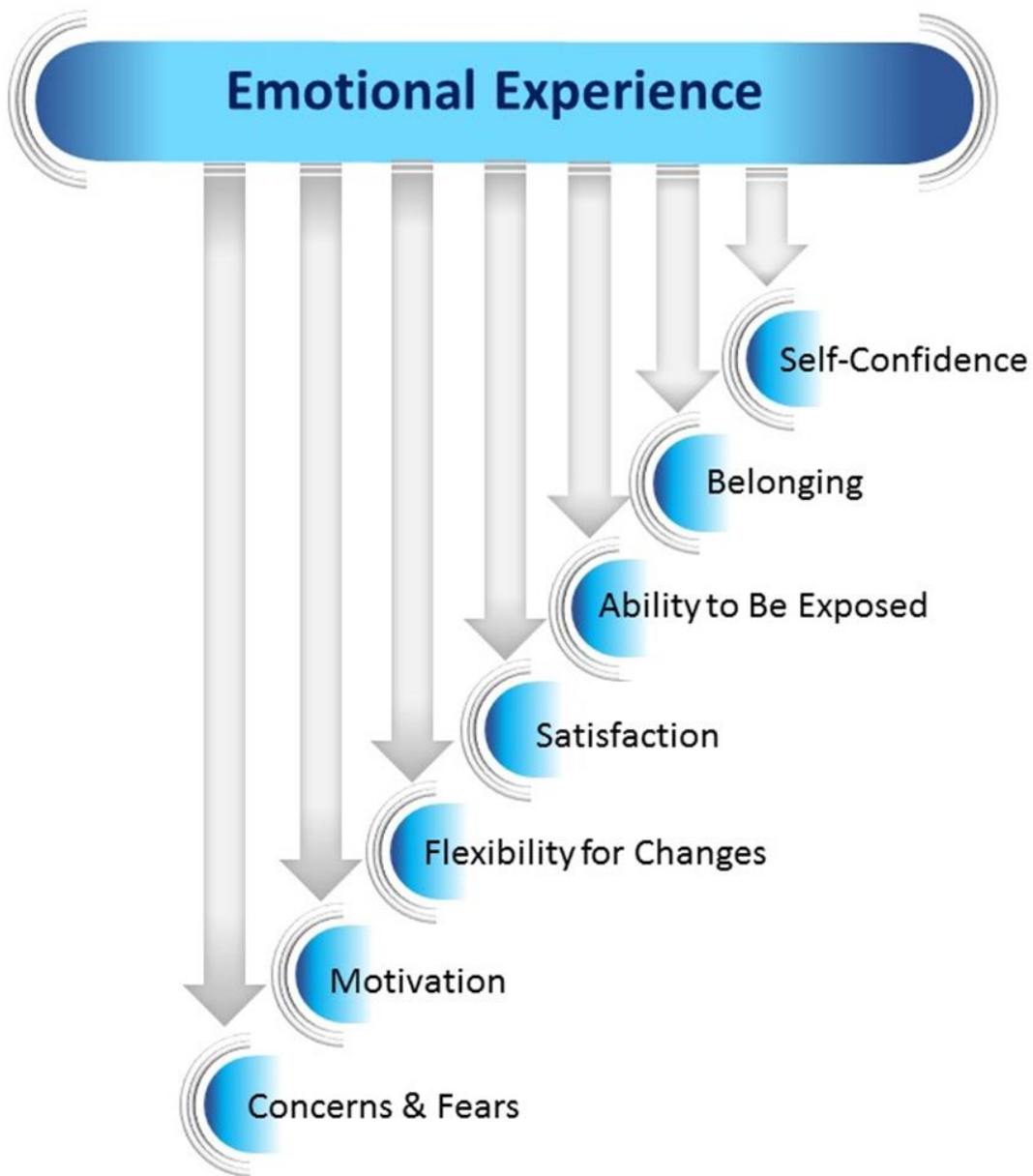
6.3.1 Emotional Experiences

Emotional experiences were expressed significantly during the analysis of the interviews. This secondary category reviews the emotional experiences that the teacher experienced in the professional learning community. The content analysis of the interviews in the personal aspect of the teachers in the community indicated that it is not possible to separate between the cognitive thinking and the emotions and to see in them separate phenomena. This secondary category illuminates the place of the feelings as they are expressed in education and focuses on the personal and professional factors that contribute to the personal development of every teacher in the community and influence the teacher's feelings in teaching and the systems of her relationships in the community (Oplatka & Rosenblum, 2014). In this community, the teachers research the personal and collective ways of teaching. The teaching is a practice that incorporates many diverse emotional experiences, such as self-confidence, enthusiasm, concern, pressure, satisfaction, love,

anger, and disappointment alongside the display of pedagogical abilities. The teacher in her work copes with her personal feelings and with the student's feelings. The learning contents that the teacher addresses requires both cognitive and emotional coping during the teaching.

Figure Number 6

Emotional Experiences – Secondary Category



In the professional learning community, it is possible to identify a wide range of emotional experiences that the teachers experience during their participation as members in the community. The emotional experience that was prominent from the content analysis of the interviews is **self-confidence**. The teachers noted that the process of peer learning in the professional learning community gave them power, strengthens their perception of their self-image, and gives them personal and professional confidence. From their statements it is possible to conclude that they feel self-confidence that is expressed in the feeling and belief that their way of teaching is correct and appropriate. Teachers noted in the interviews that the change in their ways of teaching and the great use of a variety of teaching skills increased their self-image in the holding of the lessons: “I see that I am a good teacher, that my ways of teaching are good, that my mathematical discourse is accurate.” (IV, female, 42 years old). “The participation in the community gave me self-confidence in the way of teaching that I teach and strengthened in me the feeling that I am a good teacher in my own eyes and in the eyes of others.” (OG, male, 38 years old). “Following the participation in the community I feel that I am a better teacher both in terms of teamwork and in terms of my ways of teaching in the classroom and the preparation of materials for my students.” (OL, female, 49 years old). Similarly, teachers whose teaching experience is up to ten years emphasized in the interviews the self-confidence they acquired in the community although they were teachers in their first years of teaching in the education system. The self-confidence was expressed in the daring to break boundaries. “The participation in the community gave me confidence in my professional path, I understood that although I am young I am teaching correctly and that I am very creative.” (OS, female, 28 years old). “In light of the positive criticism I became more open and more confident in holding additional lessons for observation ... this changed me ... this caused me to be braver, not to be afraid of innovations, of challenges, “to leap into the water”, to leave the comfort zone, to dare and to attempt new methods and ways of teaching.” (YB, female, 55 years old). Teachers with teaching experience of 1-10 years emphasized the self-confidence they acquired professionally. “This community proved itself, my confidence as a new teacher

and as a coordinator increased. I became a better teacher, who enriches his students.” (OG, male, 38 years old). “The pedagogical discourse in the community strengthened in me the belief in myself, although I am not a very experienced teacher in the field of mathematics, my professional confidence increased. I obtained many reinforcements from the community members on the diverse use of ways of teaching. My lessons became more effective, I used teaching skills such as mathematical discourse and differential work.” (AI, female, 30 years old).

Teachers with 11-20 years of teaching experience noted that their self-confidence is acquired in a personal reflective process. They emphasized the self-confidence in the conversation of peers that existed following the observation lessons. After every observation lesson, there was a pedagogical discourse about the learning and the teaching, so as to improve the teachers’ ways of teaching. “The reflection after the peer learning empowered me, gave me visibility and prominence in the community and strengthened for me the feeling of professional confidence.” (RT, female, 48 years old). “The reflection caused me to perform reflection on myself, to give myself positive feedback, it reinforces my image, strengthens me mentally.” (SB, female, 40 years old).

These teachers are found in a stage of professional development that is expressed in interaction with their colleagues.

To conclude, the teachers’ statements indicate that they feel a great advantage in being members of the community and that the community strengthens their self-confidence in the choice of ways of teaching. The teacher’s self-image in her own eyes constitutes a fruitful platform for learning, for the construction of a safe learning space, and for the performance of reflection on the ways of teaching.

Teachers expressed in the interviews their feeling of **belonging** and clarified their need to belong to the group of fellow teachers. In the interviews, voices were heard that express the teacher’s sense of belonging to the community that gives her a sense of value in her life. The feeling of belonging is necessary for the educational processes that the teachers in the community experience. “I feel belonging to the group of mathematics

teachers, younger and older, less experienced and more experienced.” (AF, female, 42 years old). “I feel belonging and equal to other teachers, a sense of pride that I belong to a group of quality”. (IL, female, 38 years old). “I understood that I am not alone in the world, in the class you feel rather alone. In the community I felt the togetherness, a part of the network of people who are partners in the task. This gave me confidence, a feeling of fraternity and professional pride, a place to fall apart, to share, to identify, and to leave the professional isolation.” (SS, female, 60 years old). The teachers’ ability to belong to the community of learners is not simple. It requires of those who come to the community acceptance, trust, confidence, and even a degree of intimacy.

The teachers’ statements in the interviews indicated an authentic facet that was expressed in their **ability to be exposed** to a variety of schools, teachers from different backgrounds, and diverse ways of teaching. Some of them presented in the interviews the opportunity to be exposed to a variety of schools both in the visits that the community held and in the observation in the lessons in the different schools. This experience that encourages the teachers to expose themselves requires trust, acceptance, confidence, and a safe space.

The teachers’ insights from the interviews in this subcategory were expressed in the following quotes. “I was exposed to the teachers’ role, various schools in the external structure and in the composition of the students. I understood that although I teach in the religious school the school climate is rather similar.” (SS, female, 60 years old). “The community opened for me the option to get to know additional and parallel staff members from other schools and allowed me to connect to many professional colleagues.” (ZA, female, 45 years old). Another example illustrates the teacher’s personal feelings in this subcategory. “The ability to be exposed to a large public of teachers and to work with staffs that I do not know created in me a feeling of trust and belonging.” (AI, female, 30 years old).

The meetings in the community created new relationships between the teachers from the different schools, as the statements of the teachers indicate. “The ability to create

relationships with teachers from another sector, religious or secular, caused me to be authentic.” (OG, male, 38 years old). “The ability to share, to open up, to present, and tell about my ways of teaching greatly improved. I learned not to be ashamed and not be modest.” (SM, female, 47 years old). The content analysis of the interviews indicates that the personal and authentic relationships in the community meetings remove the masks that the teachers don, and this is expressed in the interpersonal relationships among them.

Another emotional experience that is expressed in the content analysis of the interviews is **personal and professional satisfaction** among the teachers who participated in the community. The personal satisfaction empowered them in professional terms and inspired in them the desire to belong to the community and to love the profession. The teachers felt the need to share the feeling of **satisfaction** they felt. The teachers acquire new tools and enrich their toolkit with diverse practices. They feel that the encounters in the community are very effective for them. This subcategory was common among both younger and older teachers. “I came out with good satisfaction ... I felt that my presence in the meetings does not constitute a waste of time, since sometimes I feel that I am participating in other in-service training courses. I felt full and rich in contents and ideas.” (ZA, female, 45 years old). “The most important thing that I took is the joy of mathematics – the happiness and joy in the learning of the profession and the transfer of these emotions also to my students. I felt that I am renewing, adding a further variety of teaching ways to my toolkit.” (YB, female, 55 years old). “I felt great satisfaction that I am not wasting my time when I am found in the community. Every encounter was planned, focused, and practical.” (SR, male, 34 years old).

From the interviews an experienced teacher was prominent who did well to share the feeling of satisfaction from her perspective. “I am an experienced teacher so that on the personal level I have sufficient confidence at work with the class and with the school staff. However, the participation in the community gave me a good feeling, a feeling of satisfaction, enjoyment and motivation. Because of these encounters I like the subject of mathematics more.” (SS, female, 60 years old).

In addition to the feeling of satisfaction that teachers felt in the encounters in the community, they noted that the encounters offered to them opportunities for the implementation of active ways of teaching in the lesson, such as “I felt satisfied when I learned something new, with a new instrument I acquired, this was expressed in that I implemented what I learned. I used a specific game or ideas for building my other lessons in different topics.” (SH, male, 35 years old). “The contents I was exposed to had considerable and positive influence, I feel that my lessons are improving over time, the students are cooperating, this causes me satisfaction and a stronger desire to invest in the lessons.” (OS, female, 28 years old).

Another emotional experience that arose from the content analysis of the interviews is **flexibility for changes**. The community enables the development for new experiences and the display of flexibility for changes in situations of teaching and in the personal perceptions of the teacher. This openness derives from the very feeling of belonging and commitment of the teachers to one another. This is expressed in the flexibility for changes in the ways of teaching of the experienced teachers, who have 21-40 years of teaching experience, and they noted this in the interviews. “I learned about myself what I have to contribute, but also on the fact that I have the need to learn to renew all the time and in general I greatly love to learn and to develop. I discovered that I greatly enjoy teaching mathematics.” (YB, female, 55 years old). “I learned about myself that I am open to changes, not fixed in place, I display cognitive flexibility although I am an experienced teacher. In addition, I discovered that I am not afraid of changes in the ways of teaching and of new practices.” (GG, female, 40 years old). “I greatly like to renew, to enrich myself with knowledge. Although I am a very experienced teacher, I have much to learn, to renew in ways of teaching and primarily to be open to learn from others.” (SM, female, 47 years old).

Teachers with experience of 11-20 years noted that the exposure to new things and the departure from the routine enabled them diversity in the ways of teaching. They expressed this idea well. “I learned to release, I am not afraid to give the children a variety of tasks in the lesson that require different learning, such as games, activities in groups. I

learned to be more flexible in my work in the class.” (RT, female, 48 years old). “I became more open to changes, I experienced a process with myself, today I understand that not all the lessons need to look the same, rather the reverse is true, it is better to change my ways of teaching from class to class or from topic to topic.” (SB, female, 40 years old). “I am very rigid and find it difficult to release. In most of my lessons I teach frontally. The community taught me to think outside of the box ... today I feel sufficiently confident in myself to integrate play in teaching and not to think that this is a waste of time.” (GG, female, 40 years old).

Another sub-category that is expressed in the interviews is **motivation** among the teachers. Motivation is a factor that drives the teacher to adopt what she learned, to go in-depth in innovations, and to implement them in the class. The motivation causes the teacher to be active and to actively participate in the community. This subcategory is apparent in the following quotes: “The observation lessons inspired in me the envy of writers ... the lessons motivated in me the motivation to plan better lessons, I changed the style of the lesson, I planned the lesson in a way similar to the lessons I observed in the community. In addition, I changed my learning environment according to the principles I learned in the community.” (SM, female, 47 years old). “At the end of every session, I implemented all that I learned, every session enriched me with new knowledge, I found myself continuing to research and learn the issues we brought up in the session.” (AE, female, 50 years old).

“I felt a strong desire to share with my staff in the school what was done in the community ... what I saw ... new things that I learned.” (OL, female, 49 years old). The sense of personal empowerment and high motivation in the teaching of mathematics allowed the teachers to use diverse ways of teaching and to implement the contents in their work in the class. This is apparent in the pedagogical discourse in the community. The teachers noted the internal and personal motivation they experience as a part of their presence in the community.

Aside from these experiences, the research found exceptional emotional experience. The teachers in the research felt comfortable sharing the **concerns and fears**

that they experienced as participants in the professional learning community. Only after the teachers feel belonging and empathy in the community do they perceive themselves as partners, open and close to one another. This feeling mitigates these fears. It is possible to learn this from the teachers' statements. "We all make mistakes and you grow from mistakes, everything is not always perfect, everyone has coping in the class. In the first meetings I was quiet and primarily listening, I did not participate at all because of the fear that my ideas are not good enough or not correct enough or perhaps they do not have any innovation. In the continuation of the meetings, when I began to participate and I received positive feedback about my comments and ideas, this encouraged me to continue to be an active partner in every meeting." (AI, female, 30 years old). "There is the natural anxiety of peer learning and criticism ... I learned not to be afraid ... I understood that I am a good teacher, I learned to share things that come up, the discussion after the observation lessons was undertaken in a nonjudgmental manner, thus causing me to lessen concerns and anxieties of peer learning. I saw that the teacher receives a positive platform and legitimacy for mistakes." (RT, female, 48 years old). "The participation in the community helped me lessen concerns about peer learning, I am not deterred when people enter my lesson, observe me, and converse about the lesson. When I held an observation lesson, I had no concern, I felt confident in the group of learners. I did not feel that the discourse was threatening, disrespectful, judgmental, or critical." (DH, female, 38 years old). The teachers in the research shared a variety of emotional experiences that accompanied them as a part of the professional learning community. They attributed considerable meaning to emotions and feelings: self-confidence, motivation, satisfaction, openness to changes, and lessening of fears. This finding strengthens the change in the professional and personal development that the interviewees in the professional learning community experienced.

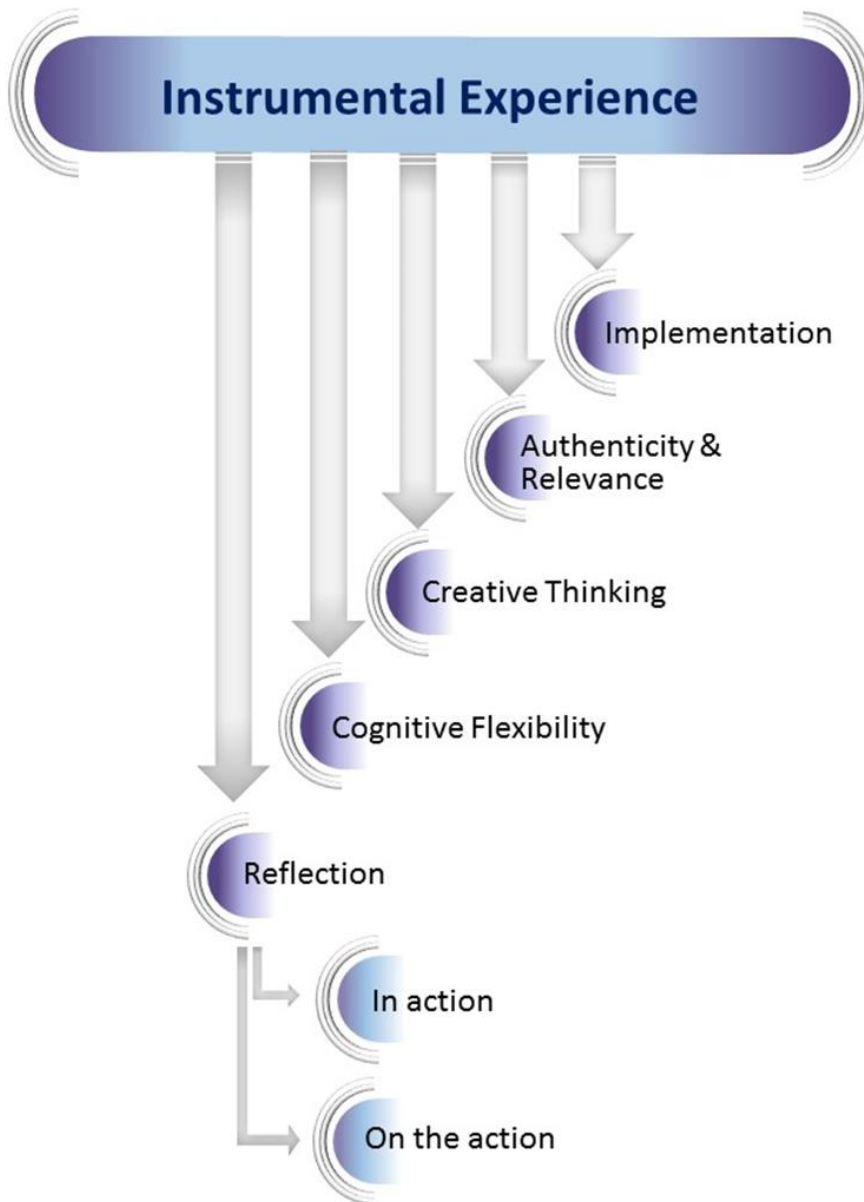
6.3.2 Instrumental Experiences

From the content analysis of the interviews in the personal aspect, the instrumental experiences that reflect a process of personal and professional development in the framework of a professional learning community were identified. From all the interviews,

quotes were chosen that indicate a wide range of instrumental experiences that link between emotions in the personal and professional dimension and influence the teaching.

This secondary category includes a variety of experiences that the teachers acquired in the community. The experiences that were expressed in interviews include personal reflection, cognitive flexibility, implementation, authenticity and relevance, and creative thinking.

Figure Number 7
Instrumental Experiences – Secondary Category



The teachers' statements in the interviews indicate that these experiences are essential to the teachers in the context of the development of professional skills, such as critical view and reflectivity in relation to the teaching practices, cognitive flexibility, and creative thinking and in the context of skills of emotional and value-oriented communication of the teacher inside and outside of the classroom.

The reflective thinking constitutes an essential component in the process of meaningful learning in the professional learning community. The teachers described in the interviews routines and regularities of the research of the activity in the classroom and noted a process of personal reflective observation essential to their development. The **reflection** is instrumental experience that is expressed significantly in the life of the community of learners. The characteristics of this experience that arose from the interviews are self-reflection, giving and receiving feedback, re-examination of the teaching, multiplicity of the viewpoints, and implementation of reflection instruments in teaching. The reflection helps the teachers in the community oriented in the constant process of learning (Sjoer & Meirink, 2016). In the interviews it was found that reflection is not a natural process in the teachers' professional culture. The analysis of the findings indicated that the reflection acts in a number of dimensions: it accompanies the teachers' learning process in the community and helps them with its conceptualization, it constitutes a basis for discourse between the teachers based on giving and receiving feedback, documents and examines processes that occurred in the community so as to draw conclusions in order to improve their work in the classroom. In addition, the reflection invites a look at the self and the multiplicity of viewpoints. This is a powerful and significant instrument that is expressed in the opinion of the teachers in the community. The reflective process that the teacher has experienced in the community enables her to look at herself and be found in a constant process of personal learning. This process is expressed in the following quotes. "I learned in the peer learning process the tool of reflection. I learned to produce the utmost from this instrument and to implement the feedback that I receive. Using the reflection, I am aware of the strong points and the points that need improvement in my teaching. The reflection greatly helps for the improvement of the ways of teaching ... it provides a

solution to the processes that the teacher undergoes.” (OG, male, 38 years old). “Every teacher who gave feedback learned also about himself, even if he only listened and did not participate in the discourse he underwent reflective processes about himself and received ideas from other teachers.” (OL, female, 49 years old). Another teacher expressed this idea well: “In the process of peer learning I learned to know the tools of reflection: reflection undertaken between fellow teachers and reflection of teachers with their students. I understood how important it is to provide time and place for the reflection of the students on their work and on their conclusions in the lesson.” (IL, female, 38 years old).

A teacher with 1-10 years of teaching experience added: “The reflection is important to my personal and professional development as a teacher, it illuminates for me points in my work. Did I learn correctly according to the principles of a best lesson? How did I respond to the students? How did the conversation go? Did the actions I performed promote the conversation and discussion in the class? Is there the building of knowledge? How is my relationship with the students? How do I run the lesson not only in mathematical terms?” (AI, female, 30 years old).

The content analysis of the teachers’ statements in the interviews indicates that the reflection is a two-way process that has caused the teachers to look back and to address the experiences they had in the community. “I felt that I am becoming more effective ... focusing ... becoming good, more professional and accurate. The reflection gave me a broader view on the teaching and on myself. The community presents to me a mirror, which teacher am I? What am I good in and what do I need to further improve?” (OS, female, 28 years old). “The pedagogical discourse after the lesson encouraged me to examine things with a critical eye and to provide relevant feedback on the lesson. And to also perform reflection on the lesson and on myself.” (AE, female, 50 years old). As aforementioned, the reflection is meta-thinking that deploys processes of self judgment and criticism on the teacher’s educational and instructional action she performs. It helps her think about her practices in new ways.

A professional learning community promotes two-way interaction between the teachers in the community and between the teachers and the instructor. This interaction encourages reflective dialogue that entails two types of reflective practices: reflection in action and reflection on the action.

Reflection in action is performed during the instructional and interactive activity that occurs in the class as the teacher's response to activities during the teaching in the class (Schön, 1983, in Reichenberg, 2006). This process occurs on the level of the individual. The reflective ability that the teachers acquired through the pedagogical discourse that occurred in the community was expressed in the following quotes. "The pedagogical discourse caused me to think about processes or lessons undertaken in the community, what I will implement in my work and what not ... how it was possible to do differently ..." (SL, female, 44 years old).

Additional teachers expressed this idea in a similar manner. "Following the insights and conclusions I produced I became possessed of reflective thinking. I am aware of my ways of teaching in the lesson, I learn from my mistakes, and I change the teaching practices following musings during the lessons. Did I build the best lesson in which the children learn meaningful learning? Did I engage in the building of knowledge and not in the giving of knowledge? Do the children enjoy the lesson?" (ZA, female, 45 years old). "I built better lessons following the comments I received in the pedagogical discourse in the community. In these lessons I improved my interaction with the students and thus promoted their achievements." (YB, female, 55 years old). This process of reflection in action is meaningful to the teachers' professional development.

Reflection on the action is a process of the critical thinking about the actions that have already been performed and the interactive events that occurred during the lesson (Schön, 1983, in Reichenberg, 2006). This process occurs both as independent thinking and with the instructor's mediation. The reflection on the action is expressed in the teacher's interviews. "In the community I learned to be a partner in professional thinking – to think in a team. I got to know in-depth the feedback instruments: I learned to provide

feedback for fellow teachers according to the outline that the instructor presented. This outline makes them disciplined, prevents the transmission of criticism on a personal and judgmental background.” (GG, female, 40 years old). “The reflective process awakened in me a different look on the lesson, enabled me additional processing and internalization of processes that occurred in the lesson. Because of the reflection I am more aware of my ways of teaching, I learn from mistakes. The reflection focuses for me points for improvement and preservation.” (SH, male, 35 years old). “I improved the skill of asking questions in that I was a witness of the conversation of teachers with their students. I learned to produce processes and to work on things that happened, in such a way that they will improve my teaching. The community makes me into a better teacher.” (OG, male, 38 years old). “The pedagogical discourse promotes my professional part: I do meta-cognition on my work. I learned to be critical of myself, in addition I learned about myself that I love renewing and diversifying my ways of teaching.” (AF, female, 42 years old). A teacher at the start of her path, who has 1-10 years of teaching experience, emphasized that the reflection greatly helps her work and described this point in an interview: “The conversation and reflection following the lesson have considerable importance and significance. First, the teacher clarifies to the group important points: the goals of the lesson, the background on the students, the background on the learned topic, and previous knowledge of the students. In addition, a conversation on the lesson is held, insights and issues arise from the lesson, every teacher proposes ideas for increasing effectiveness and improving the lesson, a shared bank of ideas is created – which constitutes for me a vital toolkit for my lessons. The reflection helps me enhance and learn the lesson in an in-depth and thorough manner and the ability to draw essential conclusions for my work as a teacher.” (OL, female, 49 years old). This process of reflection on the action was managed by the instructor, who led the teachers to share and further their insights. The instructor was for the teachers a source of knowledge who defines for them what is the best practice and a source of the deepening of their professional expertise. The improvement of the practice and the promotion of the professionalism of the teachers were intertwined.

Additional instrumental experience that was identified from the interviews is the **authenticity and relevance** of the contents revealed and acquired in the professional learning community. The teachers perceive the knowledge acquired in the process of learning in the community as interesting and enabling them personal and professional development, when they engage in contents according to their preferences and their areas of interest. They feel relevant in their way of teaching and tend to go in-depth and to experience topics that interest them. Teachers with this perception noted that: “The community enables me to update on what is being done. To be authentic and relevant. To renew, to be very precise in my ways of teaching. To be exposed to diverse ways of work and to different methods.” (SM, female, 47 years old).

“The contents that I acquired had a positive impact on my motivation and desire to be up-to-date, innovative, and relevant.” (GG, female, 40 years old). “During the encounters I acquired new methods and ways of work. I saw new tools. In the meetings we learned and updated in innovations of the teaching of mathematics, such as styles of dialogue, authentic conversation, and linkage of mathematics to everyday life.” (AI, female, 30 years old).

The teachers reported in the interviews a change in their pedagogical perception. They translated the knowledge they acquired in the community into practical changes in teaching and assimilated the ways of teaching in their work in the classroom. This point characterizes the instrumental experience that reflects ways of **implementation** of effective teaching practices, mathematical contents, and activities on different levels of thinking. The community of learners exposes its teachers to a rich learning environment that can be implemented in concrete situations. The community is aimed at the best implementation of knowledge, tools, and practices that were acquired in the community, so as to lead them to be expert in the field of the content, to promote the students’ achievements, and to create meaningful learning. The content analysis of the interviews indicates examples of the implementation of the instruments acquired in the community as raw material for the best teaching in the class. “I implemented the principles of the teaching of mathematics I learned in the community, such as the use of means of illustration,

differential teaching in small groups, use of diverse tasks. I felt personal empowerment in the use of these instruments.” (SA, female, 30 years old).

Experienced teachers, who have 21-30 years of teaching experience, indicated that they received in the community confidence to implement ways of teaching that they were afraid to teach. “I implement ideas and activities in the lessons that years ago I was not ready to use, today I understand how important it is to teach mathematics in a different way.” (SL, female, 44 years old). A teacher at the start of her path, who has 1-10 years of teaching experience, emphasized that she implements everything new that she experiences in the community. “I implemented many new ideas, everything that I learned, the next day I already implemented, when it is hot so as not to forget.” (OS, female, 28 years old). Teachers with the position of subject coordinator emphasized in the interviews that the implementation of what they learned was expressed not only in their work in the classroom but also in their work with the staff of teachers in their school. “The contents I am exposed to have a very positive impact on my teaching. I implement the contents and also convey to the mathematics staff of my school so that they too will implement new activities and ideas.” (SM, female, 47 years old).

Personal reflection, authenticity, relevance, and implementation are a part of the range of instrumental experiences that helped the teachers reshape their teaching methods and develop professional skills, for example, criticism and reflectivity regarding the teaching practices.

Another instrumental experience that arose from the interviews and facilitates the coping with situations and changes that are not always known to the teachers is **cognitive flexibility**. Flexibility in this context is the adjustment of teaching situations to changes that the teachers in the community encounter in everyday life. The community offered the teachers situations in which they increased the flexibility of their thinking and broadened it into new channels. They learned to look at events from different angles, to cope with new ways of teaching, and shifted from thinking about problems to think about possibilities.

Cognitive flexibility causes teachers to be free of a fixed thinking; it gives way and space to new insights, new opportunities for learning, teaching in innovative work environments, growth, and development. Cognitive flexibility is apparent in the changes that the teachers experienced in the process of the professional development they acquired in the community. The teachers described this. “I learned about myself that it is necessary to change things, not all that I learned and how that I learned last year is suitable also this year. It is necessary to display flexibility to changes in the ways of teaching and learning and to perform the required adjustments.” (SR, male, 34 years old).

“I learned to be very precise in my comments and illuminations. To be more professional in terminology, to better know my style of teaching, and to know to clarify what to take from the community, what is suited to my class, to my teaching style, and what is not. I became more aware of the style of teaching and the ways of my teaching in the class. Frequently I act according to trial and error. I attempt new ways of teaching during movement.” (SM, female, 47 years old). The teachers in the interviews indicated that the cognitive flexibility is perceived by them as meaningful experience. “Today I can indicate about myself that I am less fixed in place. The discussions following the observation lessons caused me cognitive flexibility. I learned to produce the utmost from the reflection and to implement things relevant for me.” (AI, female, 30 years old). “Although I am an experienced teacher, with 31 years of teaching experience, I am not afraid of changes in the ways of teaching and of new practices, I learned to be open to ideas and new suggestions of teachers who are younger than me.” (SS, female, 60 years old). Teachers in the community with cognitive flexibility perceive themselves as improving in professional terms, draw conclusions, and make changes, so as to improve their teaching and their students’ achievements. These changes open before them new possibilities they did not think of beforehand.

Creative thinking is another instrumental experience that the teachers in the professional learning community acquired. Among many teachers there is the perception that not every person can be creative. In the community a space for learning is created that included diverse instructional experiences through the creation of a climate that inspires

trust and encourages creativity without criticism and judgment. The absence of criticism and judgment enabled the teachers to learn and to create new ideas and to implement them. The cultivation of creative thinking is expressed in the professional learning community in the learning of processes, skills, and creative thinking tools of the members of the community who learn from one another. The learning is performed through a variety of teaching methods and their adjustment to students and the giving of tasks that require creative thinking. It is possible to identify in the interviews that the subject coordinators emphasized especially the creative thinking as a tool that they cultivated as they are partners in the community. “The meetings in the community enriched me greatly, gave me ideas, developed the creativity in me, created in me a feeling that everything is possible, that the sky is the limit. As a subject coordinator, I became an independent learner, creative, curious, and initiating.” (OG, male, 38 years old).

“As a subject coordinator, I contributed to the pedagogical discourse that existed after the observation lessons. I gave the teachers creative ideas, I encouraged them to think outside of the box.” (ZA, female, 45 years old). “I am aware that I am not the source of knowledge, I developed original ways to teach both my students and the teachers in my staff to identify the knowledge, to analyze and to create something new by themselves.” (AF, female, 42 years old). Creative thinking helps the teachers in the community in not only the cultivation of their students’ creativity but also the praise of teaching. “I learned to integrate students in the lesson, tasks, and activities that include coping with changes, lack of certainty, and finding creative solutions.” (SA, female, 30 years old).

To conclude, the personal aspects presented in this category included emotional experiences and instrumental experiences that promoted the teacher in terms of his professional and personal development. The teachers developed abilities for best and effective teaching, acquired self-confidence and cognitive flexibility, and implemented the contents they acquired in the classroom. Consequently, the teachers’ level of motivation in teaching rose.

These experiences recognize the importance of teacher agency, or in other words, the importance of transforming the teachers from passive recipients of contents to active creators of processes of pedagogical learning, development, and improvement. In addition, the teachers developed skills of self-expression of feelings, emotions, thoughts, and insights. These experiences inculcated an emotional self-awareness for the best coping with the personal-educational challenges and led the teachers to meaningful learning.

6.4 Professional Aspects in the Field of Mathematics

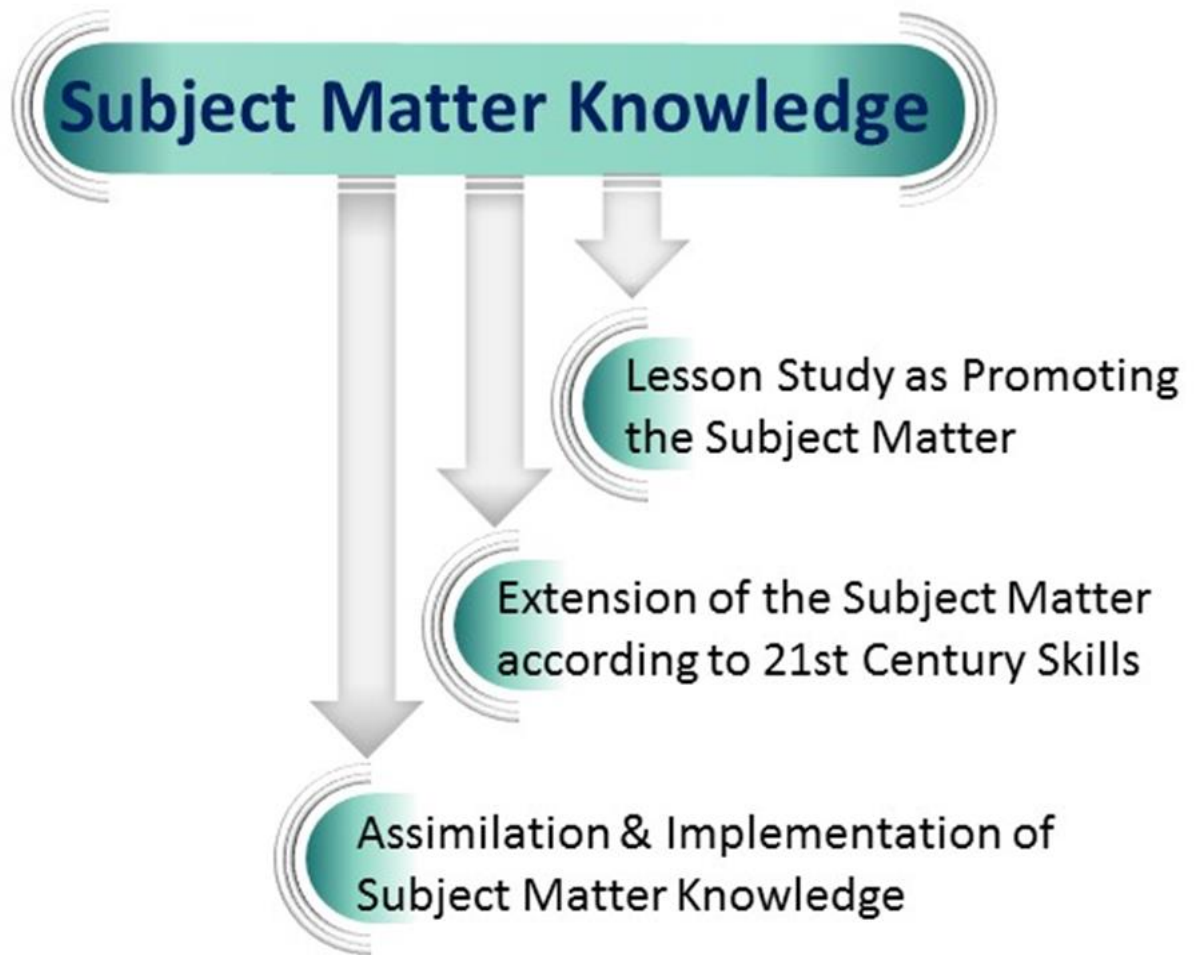
The professional aspects in the field of mathematics include the subject matter knowledge and the pedagogical content knowledge. The subject matter knowledge (SMK) includes in-depth knowledge of the content knowledge and it depends on the curriculum in mathematics, or in other words, the knowledge of the facts, concepts, structures, principles, manner of their organization, and relationships among them. Pedagogical Content Knowledge (PCK) is knowledge that is unique to the mathematics teachers and that develops during the teaching. It includes knowledge about the processes, skills, teaching methods, and core tasks in teaching, primarily the ability to translate theoretical knowledge into practical knowledge. This type of knowledge includes ways for the presentation of ideas in the content field, for instance, analogies and examples.

6.4.1 Subject Matter Knowledge

Subject matter knowledge is the knowledge necessary for the teachers for the purpose of their success at work. It is important that the teacher have mathematical subject matter knowledge that includes numerical insight, ability to explain arguments, and with calculation strategies. Subject matter knowledge has tremendous importance for teaching and for the improvement of the teaching.

Figure Number 8

Subject Matter Knowledge – Secondary Category



The teachers in the content analysis of the interviews describe the content knowledge that they acquired in the community as commensurate with the components of the knowledge. The teacher described this, “I developed and extended my mathematical knowledge, in numbers and in actions, data research, geometry, and measurements.” (SA, female, 30 years old).

A teacher with 1-10 years of teaching experience noted that her participation in the professional learning community extended her mathematical subject matter knowledge. “The meetings in the community enabled me to learn topics in the field of knowledge in which I engage, to go in-depth in the professional knowledge, to learn extensively on the issues and concepts in mathematics and geometry. “The meetings in the community allowed me to learn topics in the field of knowledge I engage in, to further the professional knowledge, to learn extensively about topics and concepts in mathematics and geometry. To every meeting in the community the instructor brought theoretical articles, exposed us to new theories, which we as teachers do not have access to or do not have time to engage in them.” (IL, female, 38 years old).

The teachers emphasized in the interviews that the broadening of the mathematical subject matter caused them to be better and more professional teachers. This is expressed in the following quotes. “In the community I was exposed to questions from a higher order of thinking and ideas for the beginning of the lesson.” (OL, female, 49 years old). “I learned how to improve my mathematical conversation with students and how to teach the children to use correct and accurate mathematical concepts.” (GG, female, 40 years old). “I was exposed to the model of explanation, the different ways to solve problems, and to find different strategies for the same problem, I learned to be very accurate, to be a professional teacher of mathematics.” (AE, female, 50 years old).

From the analysis of the content of the teachers’ statements in the secondary category of subject matter knowledge domain, it is possible to identify three characteristics:

1. Lesson study as promoting the field of knowledge.
2. Extension of the field of knowledge according to the skills of the 21st century.
3. Assimilation and implementation of the subject matter knowledge.

The teachers addressed these characteristics in the interviews in a way that is prominent, meaningful, and relevant for them.

The subcategory of **lesson study as promoting the subject matter knowledge** was prominent in the interviews. Lesson study is very meaningful to the professional learning

community. It involves the teachers in a circular process of study, development, and analysis of teaching practices. The teacher plans a lesson with the accompaniment of the instructor, the community members observe the lesson, and hold a pedagogical discourse following the lesson. In this process of analysis, the knowledge is crystallized, a product of the processing and mental change that occurs separately in each one of the teachers who are partners in the cooperative work environment (Morris & Hiebert, 2011).

The teachers described in the interviews the importance in the experiences of observing the lesson and analysis of conversations among the peers. It is possible to identify prominently the insights of the community members from the pedagogical discourse and the knowledge acquired following the discourse. The instrument of lesson study is presented by the teachers as a unique instrument that promotes the learning in the subject matter field. This idea is expressed in the following quotes. “Lesson study inspires a conversation of peers in the subject field, emphasizes the use of accurate mathematical language, and thus promotes the teacher’s learning. This is a process of the refinement of the mathematical contents of the lesson.” (GG, female, 40 years old). A teacher with work experience of 1-10 years noted. “Lesson study enables observation that promotes learning, drawing conclusions, reference to all the components of the lesson, to the mathematical ideas, and to diverse strategies of solution.” (OG, male, 38 years old). Experienced teachers with 21-30 years of teaching experience emphasized the contribution of lesson study to the promotion of the subject matter knowledge. “Discourse following the lesson study is not theoretical, it enables analysis of strategies of teaching ways, inculcation ways, and learning from the teachers’ mistakes. Lesson study provides further angles for viewing, makes the lesson and the content more interesting, and helps the teacher build mathematics lessons and thus causes the teacher to be an expert who knows to identify what is the knowledge needed to promote his students.” (SL, female, 44 years old).

“In my opinion, discourse and reflection following the lesson have importance and considerable meaning in the field of the teacher’s mathematical knowledge. This knowledge helped me in the prevention of mistakes and the improvement of the teaching

of the subject. I was exposed to rich lessons with interesting examples that offered for me many learning possibilities.” (YB, female, 55 years old).

To conclude, lesson study is an instrument that promotes the teachers in their teaching, it provides opportunities for reflection following the experiences of the teachers as a part of the professional development.

Another characteristic of the subject matter knowledge is the **extension of the knowledge field according to the skills of the 21st century**. This characteristic is suited to the national plan that has the aim of preparing the students for life in the 21st century (Sharkey & O'Connor, 2013). A professional learning community, in this context, has two main roles: to be a teacher who navigates in a changing world and a teacher who inculcates in his students the skills required for life in the 21st century.

A teacher shared in the interview how he learned to cultivate his students to be independent learners with self-directed learning. “I learned in the community how to plan lessons in mathematics that are based on the structuring of knowledge and the development of an independent learner. The student bases on previous knowledge that he acquired and experiences through activities of investigation to acquire new knowledge.” (SB, female, 40 years old).

Teachers noted the fact that the instructor of the community modeled mathematical lessons based on the construction of knowledge. “I was exposed to an innovative, non-frontal lesson, in which the teacher developed knowledge among the students through research activity based on prior knowledge.” (AE, female, 50 years old). It is possible to indicate another example that emphasizes the construction of knowledge. “In the pedagogical discourse held following the lesson I first understood how it is possible to enable every student to develop and to realize his abilities as much as possible and what my role as a teacher in the development of the student’s knowledge is.” (SH, male, 35 years old). In the professional learning community the teachers learn how to minimize their presence in favor of learning processes regulated by the learners themselves.

Another skill of the 21st century is the exposure to the resources of content and digital instruments that give the teachers an innovative learning environment in the digital era. The teachers in the interviews emphasized that their presence in the community enabled them to be exposed to innovations existing in the knowledge field and to the instruments necessary for the teaching of mathematics. “We integrated technological means in teaching: games, applications, affiliation of computerized tasks for students, and digital mapping of the test.” (ZA, female, 45 years old). Beyond the digital instruments that the teachers acquired, some of them noted the importance of the pedagogical discourse that existed in the community on the integration of the technology in the teaching. One teacher expressed this well. “I learned what the pedagogical potential of computerized learning is. How it is possible to be found in a wide variety of tools? When and which tools can be used? And what is the added value of the integration of a technological instrument in the lesson? ” (SH, male, 35 years old).

The **assimilation and implementation of subject matter knowledge** is another important characteristic that is expressed in the professional learning community. During the meetings of the community, the teachers acquire broad and diverse practical knowledge. One of the goals of the community instructor is that the teachers will assimilate and implement the practices they acquired in the community. The sharing of the knowledge of the teachers in the community is expressed in the assimilation of the new knowledge they acquired during the lesson study. The mathematics coordinator described this. “In the community we learned how to assimilate new learning plans in the classroom and in the school and how to cause the teachers to implement learning programs in the teaching.” (SR, male, 34 years old). The mathematics coordinator noted her personal contribution in the assimilation of the contents, “I conveyed all the mathematical contents that I learned to the mathematics staff of my school and I implement these contents myself.” (SA, female, 30 years old).

Teachers with 11-20 years of teaching experience noted the implementation of instruments to which they were exposed and which caused them to improve their teaching. “The instruments I acquired – the cultivation of discourse and inquiry, giving and receiving

feedback, peer learning, cultivation of explanation abilities caused me to teach in an optimal manner.” (SB, female, 40 years old). “In the observations in the lessons of a fellow teacher I broadened my mathematical knowledge in the teaching of simple fractions and I knew to use this knowledge in the teaching of the topic to my students.” (RT, female, 48 years old).

Teachers in the community noted the positive influence of the assimilation of contents relevant to their teaching. This is expressed in the sentences that repeated in the interviews, such as “the contents that I teach in the community have a positive impact on my teaching since I become a better teacher.” (SR, male, 34 years old).

“I implement what I learn ...” (OG, male, 38 years old). “I develop all the time ... I think about my ways of teaching and improve them.” (OL, female, 49 years old). “This influenced my aspirations, the desire to be up-to-date, to renew, to be relevant, to inspire curiosity and to awaken learning.” (GG, female, 40 years old).

The change and assimilation of teaching practices are possible only if the members of the community examine them methodically and implement them during constant learning.

To conclude, the broadening of the knowledge in the subject matter knowledge field among the teachers in the professional learning community is characterized by knowledge that is acquired during pedagogical discourse that occurs following the lesson study. The assimilation and implementation of the subject matter knowledge are undertaken in constructive ways in the meetings of the teachers in the community.

6.4.2 Pedagogical Knowledge

Pedagogical knowledge is knowledge unique to teachers, and it develops during the teaching. It includes knowledge about the curriculum. It includes the ability to translate theoretical knowledge into practical knowledge, different ways of teaching.

pedagogical knowledge includes reflective thinking, critical analysis of the teaching so as to improve the teacher's teaching.

In the professional learning community the teachers are exposed to a wide variety of ways of teaching and management of mathematical pedagogical discourse. They acquire pedagogical mathematical knowledge and implement strategies for the best teaching.

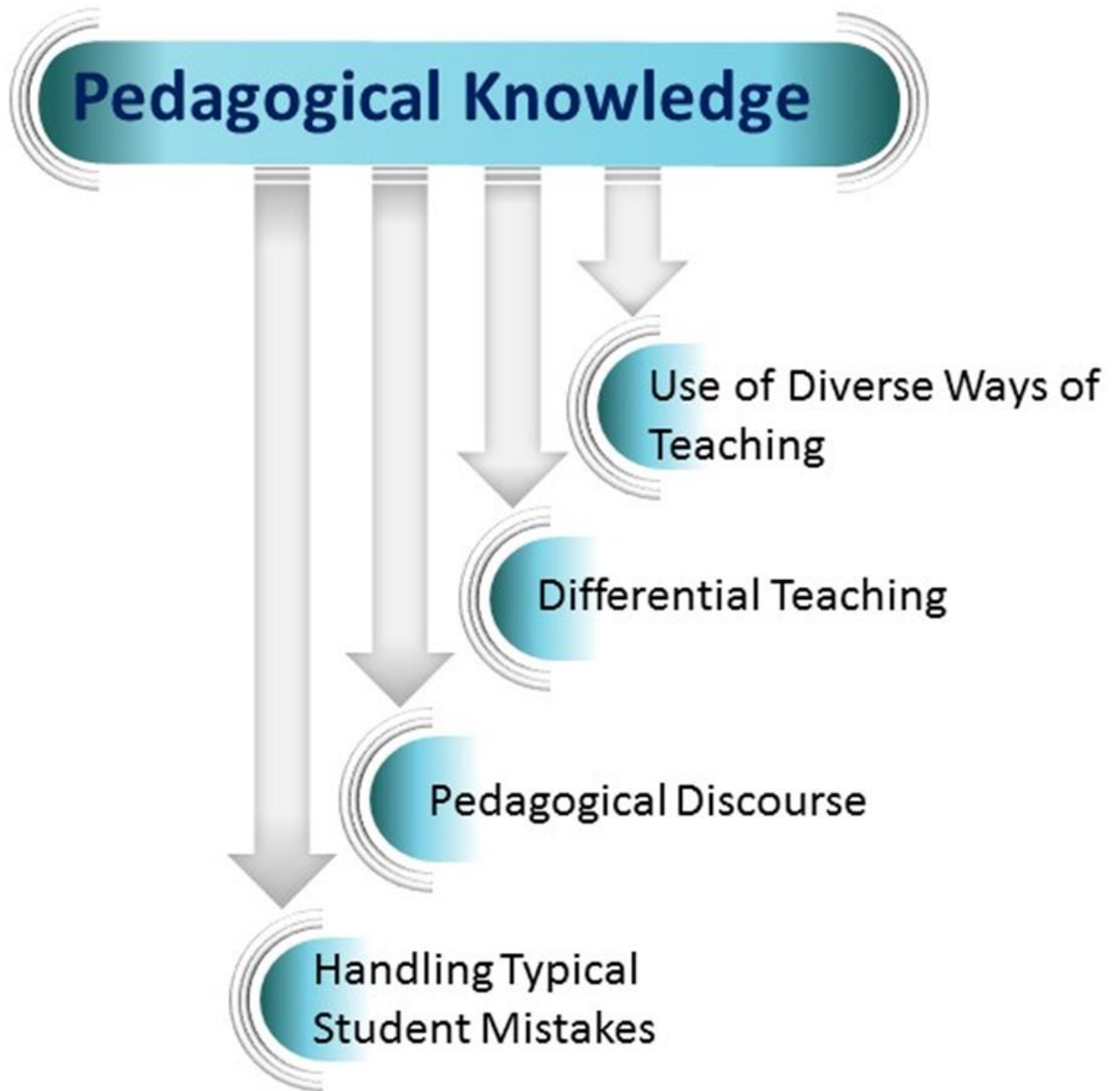
Teachers acquire innovative teaching methods, such as differential teaching and handling of typical student problems.

From the content analysis of the teachers' in the secondary category of the pedagogical knowledge it is possible to identify four characteristics.

1. Use of diverse ways of teaching.
2. Differential teaching.
3. Management of pedagogical discourse.
4. Handling of typical student errors.

Figure Number 9

Pedagogical Knowledge – Secondary Category



The **use of diverse ways of teaching** is a prominent characteristic that is expressed in the interviews. The choice of the way of teaching is undertaken according to the goals that the teacher poses in the planning of the lesson, so as to enable all the students to be actively involved in the learning experience. The teachers shared in the interviews that they were exposed to a variety of ways of teaching in the lessons that arose during the lesson study. The lessons included ways to begin a lesson, intelligent use of asking questions for the building of knowledge, and ideas for the summary of the lesson. In addition, the teachers emphasized in the interviews that the observation of the lessons enabled them to choose and to implement a variety of ways of teaching. “In the community I acquired diverse ways of teaching that include choice of teaching aids relevant to the learned topic and the ability to analyze situations of teaching. The contents I acquired had a positive and immediate impact on the teaching in my class.” (IV, female, 42 years old). “The community enabled me to develop additional teaching abilities, to renew my ways of teaching, to be exposed to diverse ways of teaching, and to illustrate different mathematical models so as to advance the students’ achievements.” (AF, female, 42 years old).

The teachers in the community use diverse methods and ways of teaching to develop a repertoire of teaching strategies. Teaching of this type is constructive teaching that integrates in the student curiosity, challenge, motivation, and enjoyment. Teachers with 1-10 years of teaching experience expressed this idea well. “I was exposed to a range of teaching ways: beginning the lesson with the integration of means of illustration, integration of games in teaching, principles in the building of the best lesson, how to hold reflection with the students on the lesson, and how to increase the students’ level of thinking.” (IL, female, 38 years old). “I extended my repertoire, I was exposed to diverse means of demonstration that I had not known beforehand. I came out with a toolkit rich in teaching strategies, assignments of a high order of thinking, ways of work in groups, learning games, alternatives in assessment, and ideas and games for opening and ending the lesson. I think I became a more expert teacher in mathematics.” (OG, male, 38 years old). A teacher added in the interview that, “I observed an experiential and enriching lesson that integrates music and playing in the learning of fractions, I did not think ever that it is

possible to integrate in the topic of fractions the use of musical instruments. I saw the light in the students' eyes. Today I am searching to integrate in the mathematics lessons diverse ways of teaching that will cause meaningful learning experiences." (OL, female, 49 years old).

Both less experienced and more experienced teachers noted in the interviews the importance of the integration of innovative pedagogy, such as the integration of computerization in their ways of teaching. In the observation lessons the teachers were exposed to lessons in which there was the intelligent use of diverse technological instruments. From the interviews it is apparent that the teachers formed strategies of the integration of computer literacy in the classroom. "I am an experienced teacher with 31 years, my knowledge in computers is sparse, and therefore I am afraid to integrate computerized devices in the classroom. In the community I was exposed to them and learned to use computerization such as digital games and today I integrate these instruments in almost every lesson." (SS, female, 60 years old). Conversely, teachers with 1-10 years of teaching experience described, "I brought to the community new ideas straight from the college. Primarily online lessons and the use of new applications in the field of mathematics, such as collaboration board, summary of the lesson using the smartphone, cooperative work, and learning on the computer for the purpose of practice." (OS, female, 28 years old).

"In the mathematics lessons I frequently used digital instruments. The use of technological instruments created for my students diversification in the learning, interest, and curiosity. I succeeded in drawing my students closer to the skills of the 21st century." (AI, female, 30 years old).

The use of diverse ways of teaching in the mathematics lessons is necessary to build optimal lessons. Most of the teachers reflect in the pedagogical discourse that occurs in the professional learning community that they implement diverse ways of teaching, such as asking questions as a teaching practice, tasks of a high order of thinking, integration of

technological instruments in teaching, and use of teaching aids for the purpose of the construction of the mathematical concepts in rich learning environments.

Pedagogical knowledge includes in it **differential teaching**. Differential teaching provides an answer to the student's needs and abilities. The teachers provide a differential response for all the students of the class so as to reach each and every student. In the interviews, both less experienced and more experienced teachers emphasized the importance of the adjustment of the contents to the students' needs and preferences (Smit & Humpert, 2012). This is expressed in the following quotes.

“The pedagogical knowledge I acquired in the community helped me change my work patterns, from a traditional teacher of frontal learning in most of the lessons I became a teacher who teaches and encourages differential learning and provides an answer to teach and every student in the classroom. I learned how to teach any topic according to the levels of thinking of students in the classroom.” (ZA, female, 45 years old). “The lessons I observed constitute for me a model of work on different levels of difficulty. I was exposed to the teacher's work with a group of students when the rest of the students received tasks of different levels of difficulty with a clear directive. I learned how to identify the students' learning and emotional needs and to give them an answer. Thus, for example, in a lesson based on learning focuses I give the students a different task in every focus.” (YB, female, 55 years old).

The mathematics coordinator noted in the interviews that he is exposed to lessons where there is differential teaching. This exposure caused him to evaluate and manage processes of differential teaching of the teachers in his school. “The pedagogical discourse in the community focused in me the importance of differential teaching in a heterogeneous class. In the community I obtained operative instruments for the differential implementation in the lesson. I planned with the teachers mathematics lessons based on the adjustment of the content to the learners according to the students' needs and preferences.” (SH, male, 35 years old).

This subcategory is based on processes that enable the teacher to adjust the teaching to the different students in diverse ways. Differential teaching requires of the teachers a constant conversation about the best work routines so as to develop ways to adjust the teaching to the students.

Pedagogical discourse is another characteristic of pedagogical knowledge that is apparent in the interviews. Pedagogical discourse is an instrument that cultivates and manages a fruitful conversation, which helps the reciprocal learning and contributes to the improvement of the teaching. The pedagogical discourse constitutes a meaningful part in the professional learning community. It enables the teachers in the community to act together, to examine their teaching, to research it, and to improve it methodically.

In this conversation the teachers share with their peers their practices and the insights that arose in the mathematics lessons so as to learn from the strengths, challenges, problems, dilemmas, and solutions of one another and to develop pedagogical knowledge and expertise.

From the content analysis of the teachers' statements it is evident that the pedagogical discourse is a main component in the community. The teachers held routines of the management of the pedagogical discourse following the lesson they observed from different perspectives, such as pedagogical aspects in the field of the content, management of the mathematical discourse, asking questions, and building knowledge. A teacher described this in the interview. "The pedagogical discourse was for me a mirror. What was special in the conversation is the cooperation of my colleagues who saw the ways of teaching as observers from the side and reflected to me things that I cannot see about myself during the lesson. In my opinion, this instrument is very practical, I am confident that I will implement the insights that arose in the conversation after the lesson." (SR, male, 34 years old).

The teachers analyzed the issues that arose in the pedagogical discourse, such as dilemmas that arose in the lesson and non-routine teaching situations. The quotes characterize this issue. "My contribution to the pedagogical discourse after the lesson

derived from the in-depth and meaningful discussion. The teachers asked me questions of clarification on the lesson. I explained to them my considerations in the choice of the tasks. I focused for my colleagues different representations in my ways of teaching.” (GG, female, 40 years old). A teacher with 11-20 years of teaching experience shared in the interview. “I was amazed at the ability of the pedagogical discourse to influence my ways of teaching. In the conversation there was a process of increased depth in different issues that enabled a wide variety of responses. Every teacher expressed her opinion, attitude, and actions that she as a teacher would do and this broadened my horizon as a young teacher.” (SB, female, 40 years old).

One of the components of the pedagogical discourse is to research the pedagogical principles through the observation of the real activities in the lesson, so as to know, understand, and examine these principles. This professional community encourages the adoption of an investigative attitude, which is expressed in the following quotes. “I was a partner in the pedagogical discourse, I asked questions about the lesson, I brought up issues for discussion, I made suggestions for improving the lesson, I shared dilemmas, and I brought up ideas for the solution of problems that arose in the lesson. These actions enabled in-depth observation of the lesson that was as well as musings about the mathematics lessons in the future.” (OL, female, 49 years old). An experienced teacher, with 21-30 years of teaching experience, shared in the interview that she benefits from the pedagogical discourse. “At the end of the observation lesson we researched the way in which the teacher conveyed the lesson: strong points and points for improvement. We brought up an issue for discussion: the teacher-student discourse. We went in-depth in this issue, we noted which style of dialogue existed in the group. How was it possible to improve the conversation between the teacher and the student? The pedagogical discourse enabled me to refine the small details, to ask the right questions in order to improve the lesson and the conversation with my students.” (SL, female, 44 years old). After all the observation in the lesson, the teachers in the community perform personal and group reflection. The reflection is important for the improvement of the pedagogical discourse and the cultivation of the teachers’ reflectiveness. Teachers expressed this idea well. “In the pedagogical discourse

we emphasized the strong points and the weak points that came up in the lesson. What was successful? What not? Why? How can we improve for the next time?” (AE, female, 50 years old). “When the instructor asked for reflection through the asking of guiding questions, for instance, what insight do I take from the lesson? I felt that there is a true and honest pedagogical discourse. This experience creates a space for thinking about the pedagogical aspects in the lesson, for everything related to the lesson (content, curriculum). The ongoing work in the school does not enable time and place for meaningful conversation or discussion following the lesson. More than once I tell myself or the teacher in the recess that I had a lesson that didn’t go well ... or I had a wonderful lesson, without analyzing the lesson as a statement.” (SH, male, 35 years old).

The pedagogical discourse promotes meaningfully the teachers in the community, enriches the pedagogical knowledge, and reinforces the teachers’ teamwork. The teachers shared in the interviews that they receive practical instruments for the implementation of their teaching in the class and extend their toolkit in ways of teaching. This repertoire is a product of consistent pedagogical discourse.

The **handling of typical student mistakes** is a characteristic of the pedagogical knowledge that focuses on the student and on the way in which he acquires knowledge. The handling of typical student mistakes is a dominant component in the lesson study and has considerable importance in the process of the teachers’ professional development. In the mathematics lessons the teachers are exposed to the typical mistakes and errors of students and acquire teaching strategies in the analysis of these mistakes. How to analyze typical student mistakes? How to leverage these mistakes for the meaningful learning of the students from their mistakes? This process was undertaken with the help of the construction of valid arguments of the teachers, the presentation of different strategies for solution through the voicing of criticism, which lead to the creation of new relationships between concepts, the teachers’ focus on the analysis of mathematical mistakes and the discussion of them, cultivates the discourse built on the students’ ways of thinking, promotes conceptual understanding, and creates a community of learners.

The content analysis of the interviews indicates that the teachers maintain that the handling of the mistakes of students is one of the essential topics discussed in the community. “I was exposed to a variety of common student mistakes and what they derive from. I learned to identify the source of the mistake and to hold meaningful learning following the students’ common mistakes.” (ZA, female, 45 years old). A teacher presented a similar perspective of the importance of the handling of the importance of the handling of mistakes. “In the conversation on mistakes and analysis of student products I greatly benefited. I learned how important it is to understand the source of the mistake and what it derives from. If I understand the source of the mistake, I can understand how to instruct the student so that he will learn from the mistake so as not to repeat it.” (AE, female, 50 years old).

The coordinators for the teaching of mathematics noted in the interviews concrete examples of their learning to handle mistakes. “I was especially interested in the meeting that engaged in the mistakes of students in geometry, what is the source for the mistake, how to deal with the mistake, how to help students learn from their mistakes. Following the lesson I begin every lesson in mathematics in mistakes of students and class children are asked to explain the mistake and correct according to the model we learned.” (OG, male, 38 years old). “The observation lessons raised in me the awareness to identify students’ mathematical mistakes. I learned to analyze the mistake, to give it an appropriate solution in ways of teaching. Today I can indicate that I professionalized in the treatment of mistakes, this is a part of my meaningful learning in the classroom. In addition, in my team meetings with the teachers of mathematics we engage in the analysis of common mistakes of students that arose from the tests.” (SM, female, 47 years old).

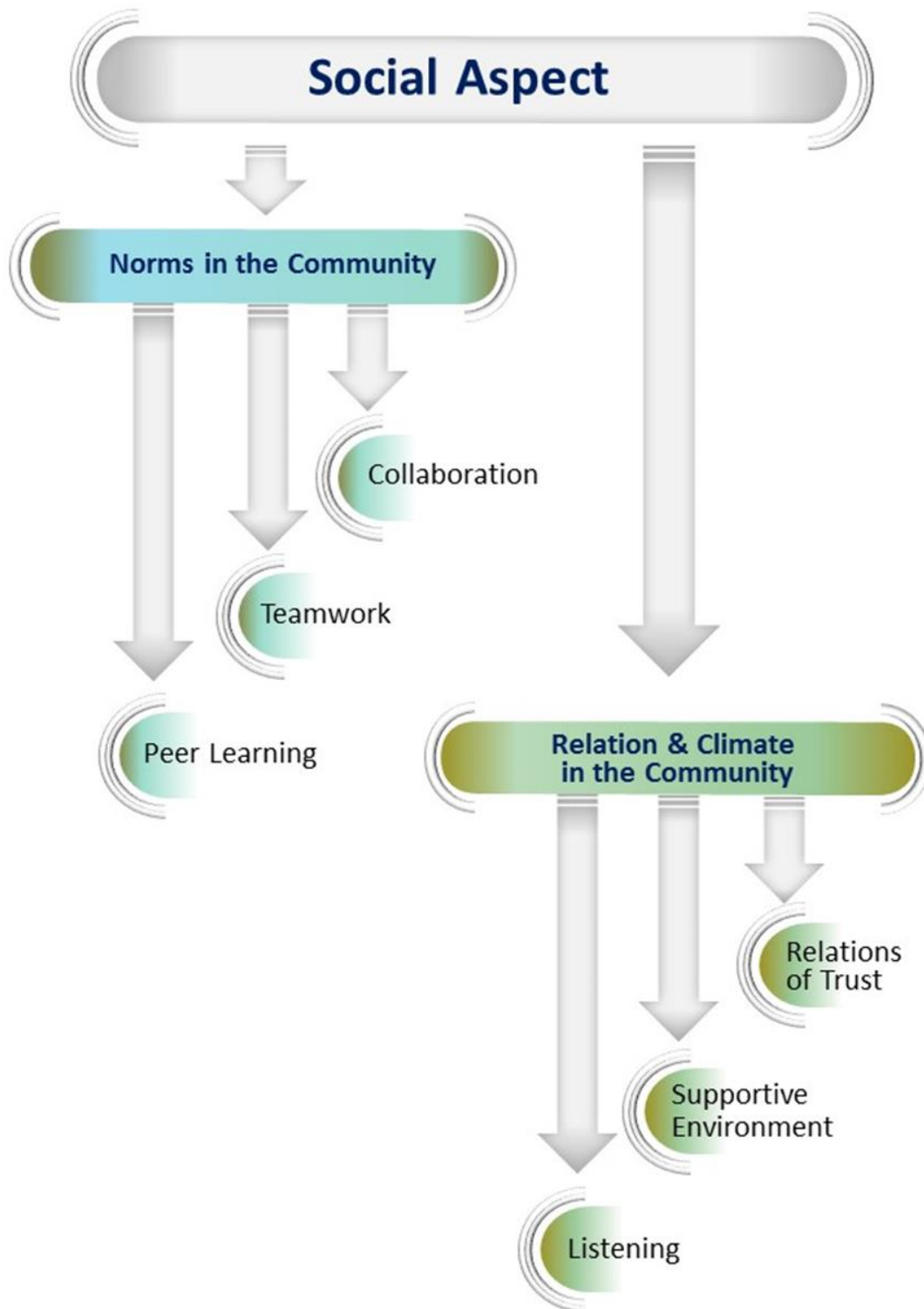
To conclude, the handling of the typical mistakes of students is meaningful to the professional development of teachers in general and in this community in particular. The pedagogical knowledge acquired in the professional learning community in the lesson study enabled the teachers to grow and to assimilate diverse ways of teaching, to teach the students in differential teaching, to hold a pedagogical discourse, and to build ways of handling the students’ characteristic mistakes.

6.5 Social Aspects

In the professional learning community patterns of the interpersonal relationships of the group participants are expressed, whether explicitly or implicitly. The professional contents and the social aspects are intertwined and influence one another. They are an inseparable part of the teacher's perception of meaningful learning, which creates a combined fabric of cognitive, emotional, and social-value-oriented aspects. In the professional learning community the social aspects were expressed in the relationships and climate created in the community and in the shared norms and values of all the community members. The community is a social framework in which the participants are found in communication with one another for the purpose of continuous learning, professional learning, personal learning, and group learning, with the involvement of those who come to the community (Wenger, 2007).

Figure Number 10

Social Aspects – Secondary Category



The content analysis of the teachers' statements in the social aspect indicated two secondary categories:

1. Relations and climate in the community, which include relationships of trust, supportive environment, and listening.
2. Norms in the community that include collaboration, teamwork, and peer learning.

6.5.1 Relationships and Climate in the Community

A **trusting relationship** is a key trait of an effective professional learning community. The teachers who are partners in the process must understand and feel that they can trust their colleagues fully. The teachers noted in the interviews that trust and reciprocal respect have created a safe space that enables the teacher to learn and to develop in social and professional terms. The teachers shared what is done in their classes openly and without fear. "In the community I feel that there is good interaction between the group members. Although I am a young and new teacher, I felt that they accepted me very nicely, they appreciate my work, and I do not feel condescension or contempt." (OL, female, 49 years old).

"I feel that my statements are respected, my criticism is accepted in a matter-of-fact way, without prejudice." (SL, female, 44 years old). In addition, another teacher emphasized that, "In the community I do not feel threatened and therefore I share my knowledge from the teaching in the class so as to obtain relevant feedback from the community members." (AI, female, 30 years old).

The content analysis of the interviews indicates that both less experienced and experienced teachers especially noted that the feedback given after the observation lessons was based on good and open communication among the group members. In the process of feedback the teachers learn to open up, to obtain the responses of their peers, and to implement their insights. "From feedback to feedback I evinced openness, I felt that I benefited from the feedback, I was not afraid that I would hurt the teacher personally but that the feedback is relevant, professional, and opens an opportunity for learning." (IV, female, 42 years old).

In addition, the concept of “confidence” recurs in the different statements in the interviews. The teachers need a degree of confidence to share, to raise questions, to dispute the practice in teaching, to think together. This idea was expressed in the following quotes. “In the community there are no wars.” (IL, female, 38 years old). “I do not feel an implicit competition.” (GG, female, 40 years old). “I felt personal support from my peers.” (SR, male, 34 years old). “We built proper relationships of trust.” (SM, female, 47 years old). “The participation in the community contributed to me primarily in the sense of security, I can jump into the water, to learn and to experience.” (OS, female, 28 years old). “This year I felt more confidence in holding a lesson when teachers are observing me.” (DH, female, 38 years old). “I felt more confident bringing up my personal difficult to be discussed in front of the group.” (AF, female, 42 years old).

The acquisition of confidence in the aspects noted above indicates the personal growth, which is an inseparable part of the teacher’s professional development. The teachers are required to invest in the creation of trust with their peers so as to establish their status and obtain legitimacy for their work. They are willing to take risks and reveal their work in the classrooms both personally and pedagogically, when the trust relationships are established in the community. In addition, through the building of relations of trust the teachers can reduce the criticism that accompanies the processes of change they experience in the community.

From the teachers’ statements in the interviews, it is possible to identify that they adopt the ability to depend on their fellows. This ability connects among the community members and enables solidarity and social cohesion required for the effective functioning of the community. “In the pedagogical discourse I revealed my weaknesses, I spoke honestly about the processes I am experiencing since I felt that I am relying on my friends that the information remain in the walls of the community.” (AE, female, 50 years old). “I knew that there is somebody to rely on and that all that was observed and said during the pedagogical discourse remains between us and no other use is made of it.” (DH, female, 38 years old).

It is possible to identify in the interviews that the relations of trust acquired in the community led to the openness among the teachers. Openness is a source of the cohesion of the group and it establishes the reciprocal relationships among the participants, their emotions, and their perceptions. A teacher expressed this idea well. “In the community we acted with constant sharing through openness and honesty. We made our ways of teaching public and shared. The sharing is not only a motto that acts from the language outside but a way of life in the community. All this would not happen if we would not acquire trust towards one another.” (SS, female, 60 years old). Another teacher noted, “I feel the need to share with the community members both my deliberations on the one hand and my successes on the other hand, I feel an integral part of the group.” (OG, male, 38 years old).

To conclude, trust is an important and significant component in the processes of teaching in the community. Relationships of trust are vital to the routines in the community.

A **supportive environment** is another component that is expressed in the findings in the context of relationships and climate. A climate that supports a professional learning community creates a comfortable climate and a supportive atmosphere that is characterized by openness, lack of judgment, social-emotional support, and respect for all participants. A supportive environment enables the teachers to learn from one another, to create rich opportunities for their growth, and to contribute to the success of the teacher’s professional development and the success of the professional learning community. From the interviews it is possible to identify statements that strengthen this component. “In the shared meetings I felt support to turn to and to seek counsel on every issue or need that arises from my everyday work in the class. This feeling derived from the respectful discourse held in the group.” (YB, female, 55 years old). In the professional learning community there is no one truth, I received encouragement to voice different opinions and ideas during the conversation and to hold a discussion on the range of products and solutions we developed together.” (GG, female, 40 years old). “The pedagogical discourse that existed after every lesson was very enriching, with the attempt to bring up different insights and interpretations, there was a feeling of a serious and in-depth attitude and all this in a supportive and encouraging atmosphere. I see this as a type of gift.” (DH, female, 38 years

old). One of the interviewees, who was asked about her processes of learning in the community, said that “Every meeting is a celebration in the heart.” (IV, female, 42 years old). In addition, it is possible to identify that the supportive environment not only is characterized by the professional aspect but also places emphasis on the emotional facet. The teachers provide one another with emotional support, with the sharing of ups and downs. They discuss different topics and concerns and feel equal to one another. A teacher noted the support she received from her fellows. “In the community we managed conversations not only in the professional contents but also in personal topics, the emotional support and the openness that existed in the community brought us closer to the professional facet.” (SB, female, 40 years old).

Teachers with 1-10 years of teaching experience noted that the community enables them to feel a part of the family and that the experienced teachers create an atmosphere of acceptance. “I felt that the experienced teachers convey a patient and empathetic attitude and inspire an atmosphere of calm and personal support, they strengthen us all the time.” (OL, female, 49 years old). “Although I was a young teacher in the education system I feel I am among equals and obtain great appreciation for the innovations I bring to the community.” (SH, male, 35 years old).

The learning environment in a supporting and nonjudgmental community encourages the need for learning and renewal, creates a culture of constant improvement, and takes the teacher from a situation of isolation. This finding is reinforced in the statements of the coordinators. “As a coordinator of mathematics in my school I feel alone, I do not have anybody to share the difficulties of the leading of the staff and in this community I receive emotional support of my feelings, this is really pleasant and far less lonely.” (ZA, female, 45 years old). “I feel that my interaction with the members of the community is better when the teachers are not judgmental and give me feedback that promotes learning.” (OG, male, 38 years old).

A supportive environment in the community motivates the teachers to be open, to trust, to do and to renew as a part of their personal and collective development.

Listening is an essential component of interpersonal communication in the community. It is a cognitive and emotional process that is expressed in the pedagogical discourse between colleagues in the community. It is apparent in the interviews that the issue of listening is expressed in a sweeping manner. Teachers noted that the instructor was concerned that every colleague in the community will learn to listen to her friends' statements and will not be impulsive in her responses. In addition, the instructor integrated in the activities with the community members skills for the cultivation of a pedagogical discourse through instruments for listening. A teacher's statements indicated that, "At the start of the year the rules of discourse: listening, openness, participation of all the team members and reciprocal respect are undertaken in an artificial and rigid manner, over time we learned to listen naturally, we understood that it is possible to make mistakes and to try and so as to examine alternative solutions for a problem that came up we must first listen with complete attention." (SM, female, 47 years old). The group members adopted for themselves norms of listening based on the reciprocal understanding of one another. This norm is unique to this community. Listening means first and foremost presence: presence here and now during the meetings. Listening requires coordination and attention, so that we can hear what the teachers are expressing, whether in the words or whether between the words. True listening builds relations of trust between the teachers in the community and supports and accompanies them in the process of professional development, empowers them, and develops their sense of self-efficacy. It is possible to indicate examples of components of listening from the interviews. "The teachers are free of ostentatiousness and egocentricity, they are not condescending, they listen to one another to learn and to enrich one another." (AI, female, 30 years old). "In the community I experienced profound listening, I felt that my fellow members are listening to me alertly, with attention to what I am sharing." (OG, male, 38 years old).

Listening creates conditions for a safe and supporting space in which the teachers acknowledge the other's emotions and thoughts and attempt to identify with their internal experience. A teacher described this, "The community created for me a safe space, I feel confident to share the insights from the pedagogical discourse that my friends listen to me

and contribute to me from their knowledge.” (SR, male, 34 years old). The goal of the listening is to bring the teachers to the investment of feelings in the conversation. The listening demands of the members of the community to silence the noise in their awareness; it involves both the outside ear and the “inside ear” – the heart. An experienced teacher, with 21-30 years of teaching experience, emphasized how important it is to listen to the teachers’ voices. “In the pedagogical discourse we shared with one another the process and planning of the teaching in the class. It was important to listen fully so as to understand not only the actions undertaken but also the considerations that preceded these actions: why did the teacher behave as he did? What did he think would happen the moment he did the action? What was the overall rationale that guided him in the process? Complete and true listening enables the staff of teachers in the community to understand both their perceptions and their outlooks as teachers.” (GG, female, 40 years old). From the interviews it is possible to identify that listening is a very important and meaningful value for the teachers in the community, not only in the learning contexts but also in the educational and personal contexts, as arising from the teacher’s statements. “In the pedagogical discourse more than once we encountered differences of opinion in our ways of teaching, in the community we talked about the differences, with listening and the attempt to understand and to give a place to different opinions and desires.” (SS, female, 60 years old). Another teacher described in this context: “The listening in the community assumed different forms, sometimes there was a conversation of pairs of teachers in which each one listens to the other and sometimes one teacher brought up an issue for discussion in the plenum and the teachers listened to diverse solutions from their personal experience.” (AF, female, 42 years old). In the interviews, another facet arose, which described the role of listening in the receiving of feedback after the observation lessons. The teacher who observed it received from the members of the community feedback about her actions in the lesson. Thus a teacher with 1-10 years of teaching experience described, “I listened to the feedback I received from my experienced colleagues in teaching and this enabled me to attain the necessary insights and to implement them in the next lessons.” (SR, male, 34 years old).

A professional learning community forms tools that contribute to the teachers in their personal and professional development. The members of the community learn to listen to others with considerable attention, change their opinions, develop ideas from the very listening, are not afraid of the scolding or mockery of their colleagues, ask relevant questions, and are open to new ideas.

To conclude, the social aspects in the field of the relationships and the climate created in the community a physical place with the values of listening and caring that develop the teachers as individuals and as a teaching staff and enable every teacher to realize all the abilities, skills, and strengths she has. In the community it is possible to identify the climate that is expressed in personal needs, emotional empowerment, building of confidence and personal and group trust. This climate invites curiosity, in-depth study, and asking of questions and develops the ability to conduct a dialogue. All these constitute a fruitful platform for personal development and growth in an optimal atmosphere in the community. The teachers who participate in the community shape their experience, and this participation has transformative potential of the members of the community as a group and as an individual, or in other words, to teach together and to learn together.

6.5.2 Norms in the Community

A learning community is a social framework in which the participants are found in communication with one another for the purpose of learning and building personal and cooperative knowledge. The building of the community is a process that has the goal of strengthening and establishing the social trust in it and is intended to create a sense of belonging that empowers the group members and the level of trust and reciprocity between them. The community members have opportunities to form standards of agreed-upon behaviors that reflect the values of the group and promote its shared goals, such as collaboration among the community members, teamwork, cooperation, and peer learning. In the professional learning community the teachers share with one another the professional and pedagogical knowledge and the teaching experiences. They ask questions of one another, require of one another explanations, build together shared ideas, and bring up

examples from the experience in the field. During the creation of these routines, in the community social **norms**, vision, and values shared by all the community members develop. A social norm defines the behavior required of the person or a group of people who share the same system of values and the same culture. The norms in the community are obligating conventions, which emerge in a dynamic social-cultural process of the teachers. In this process a collective system of values is created (DuFour et al., 2006).

The goal of the professional learning community is to create collaboration between the teacher colleagues in the community so as to enable access to a wider variety of opportunities for learning of all the partners. The content analysis of the interviews indicates that the norm of **collaboration** is prominent and meaningful for the teachers in the community. In the community an atmosphere of learning that encourages collaboration is created so as to extract the teacher from her isolation behind the classroom doors, to allow her to learn and to advance, to improve her students' achievements, and to develop patterns of collaboration in terms of the knowledge matter field, the pedagogical knowledge field, and emotionally.

In the field of the pedagogical knowledge, the teachers in the community created routines of involvement. The collaborative conversation is undertaken through meetings that involve constant research and reflective discourse. A teacher noted that the involvement in the community helped her acquire teaching practices, "Diverse ways of teaching that gave me a response to the differences in the class. In every session the teachers shared activities and ways of teaching that the teacher adopted so as to make the students like mathematics." (DH, female, 38 years old). A teacher with 11-20 years of teaching experience described the contribution of the involvement in the community as a response to her teaching: "In every meeting the teacher who held the lesson involved us in considerations and in goals for the planning of the lesson. This involvement caused me to muse about the planning of my lessons and when I returned to the class the topic of the formulation of the goals in the lesson resonated." (SR, male, 34 years old). The subject coordinators expressed the added value of the cooperation in the community as a tool for the creation of a database of learning materials, such as "creative lesson plans" (ZA,

female, 45 years old), “database of tests” (GG, female, 40 years old), “alternative ways of teaching” (OG, male, 38 years old), “inquiry activities in mathematics and computerized games” (OS, female, 28 years old). Another prominent finding identified from the interviews is that the teachers shared with one another the different coping with the ambiguous situations in the lesson. “I learned from my friends how to cope in situations of teaching that I had not anticipated ahead of time, such as solving a non-routine exercise. This is a situation that arises often in the lesson. The teachers shared solutions and offered ways of coping in these situations.” (AF, female, 42 years old).

In the community a norm is created of reciprocal and in-depth learning, not through power or directives from above but in terms of self-reflection. The teachers shared the insights from their personal learning following the reflective discourse that was held after the lesson. This finding is prominent in the interviews both among less experienced teachers and among experienced teachers. The teachers noted that the sharing of the insights after the observation lesson enabled them to research and to understand what an optimal lesson is. This issue is apparent in the following quotes. “In the reflective discussion after every lesson the teachers presented strong points and points for improvement. These insights helped me understand the principles of an optimal mathematics lesson.” (SB, female, 40 years old). “I am exposed to optimal teaching and become a better teacher. In the shared discussions after the lesson I learned to ask productive questions following the lesson, to identify junctures of mathematical discussion, and to implement them in my lessons.” (SH, male, 35 years old). Routines of involvement in the community were expressed in the presentation of different pedagogical approaches and skills for the improvement of the practice. The teachers in the community rely on internal knowledge and create an integration of the knowledge and the pedagogical tools that they acquire along with their colleagues. A teacher described this as follows: “The learning in the community with peers from other schools opened in front of me opportunities for cooperation, a fruitful conversation between colleagues, and reciprocal cultivation in the pedagogical aspects.” (IL, female, 38 years old).

In the knowledge field of the teaching of mathematics, the teachers in the community shared with one another the mathematical contents that were expressed in the observation lessons and in the discussions in the community. The knowledge field of the teaching of mathematics includes in-depth knowledge of the facts, concepts, structures, and mathematical principles. A teacher with 1-10 years of teaching experience expressed this cooperation well: “In the observation lessons I learned how to help students to solve mathematical problems, to know a range of solutions, and to teach the students how to explain an answer.” (OL, female, 49 years old). The teachers identified processes of teaching that emphasize the building of knowledge and not the giving of information, the inculcation of mathematical concepts in diverse ways, and the intelligent use of means of illustration in mathematical activities. This issue is expressed in the interviews. “As a young teacher, I was exposed to the advantages inherent in the regular use of the means of illustration, I was surprised to discover that the means of concretization create enjoyment and motivation among the students and enable them to think in different ways.” (DH, female, 38 years old). “I learned to plan lessons based on inquiry and discovery, lessons based on the building of knowledge.” (ZA, female, 45 years old). “In the pedagogical discourse after the observation lessons I was privileged for the sharing of the community members of the correct use of mathematical concepts and this enhanced and furthered my mathematical knowledge.” (AI, female, 30 years old).

Experienced teachers with 21-40 years of teaching experience noted that following the pedagogical discourse that was held after the lesson they acquired the ability to connect a mathematical concept to different content areas and to the everyday life. “Following the conversation with my colleague I am attempting to begin every lesson with a problem from the students’ world and I emphasize the relevant mathematical concepts that are expressed in the task.” (SS, female, 60 years old). “We researched the relationship between the learned shapes and figures and objects and phenomena in the students’ environment.” (SL, female, 44 years old). “We shared with one another authentic tasks that every teacher built for her class, we created a store of tasks taken from the everyday reality.” (YB, female, 55 years old). The sharing in the aspect of the knowledge field is meaningful for the

professional development of the mathematics teachers. This issue was identified in the interviews of both less experienced and more experienced teachers. “I liked that the community members do not keep all the ideas, materials, and strategies to themselves, but work together to provide a response to the students’ needs and to improve their achievements.” (ZA, female, 45 years old). “We created a collaborative platform for the uploading of materials, theoretical models and articles related to the topics from the curriculum in mathematics, as well as articles that address mistakes typical of students in crisis. This platform enriches me and helps me with the planning of teaching.” (SB, female, 40 years old). “On the basis of the shared knowledge created in the community, I became aware of the goals and standards expected of the students in every topic.” (SA, female, 30 years old).

The teachers in the professional learning community described in the interviews that their participation in conversations and discussions created in them the abilities to identify effective teaching practices and to disseminate them in the class. In this peer learning the group members invest suitable effort in the learning process and in the implementation of knowledge and teaching skills. The teacher described this, “In one of the sessions we observed a lesson that addressed the topic of fractions that had developed in ancient Egypt. In the lesson the Egyptian arithmetic that addresses fractions was presented. This topic was new for me, I found relationships between their manner of calculation and our manner of calculation. In addition, I also saw the differences in more complex calculations. The collaborative learning helped me in the openness to the topic and in leaving behind cognitive stagnation, finding different strategies for solution.” (SH, male, 35 years old). Other teachers expressed this idea, “In the community I was exposed to tasks that enabled the solution in a variety of ways. Finding diverse ways of solution gave me a feeling that mathematics is not just a rigid subject with unequivocal laws that obligates one way of solution. “In the observation lessons the teachers shared the teaching units that engaged in the cultivation of the student’s explanation ability. As a young teacher, I learned to plan teaching units that engage not only in calculations and in practice but also combine the development of numeral insight and explanation.” (OG, male, 38

years old). “I brought up for discussion in the community my students’ erroneous perceptions in the topic of multiplication. The teachers enriched me with ideas and strategies for the handling of mistakes, ways that I can implement in the classroom.” (RT, female, 48 years old).

Teachers noted in the interviews that in the community they learned to map a mathematical topic in coordination with the mathematical principles and the curriculum. Learning based on cooperation invites the teachers to re-examine the mathematical principles and focus on them. This finding is expressed in the interviews. “I identified mathematical ideas during the observation of the lessons and after the discussion in the community I changed my teaching on the topic of the opening of the lesson. Every mathematical lesson I created a challenging opening that is accompanied by a mathematical conversation, without these discussions I would not change.” (IL, female, 38 years old). “I brought new ideas to my class following the productive conversation between members and I integrated an opening task for students at the start of the lesson. A task that links between previous knowledge and knowledge required in the lesson.” (AI, female, 30 years old). “We engaged in the analysis of mathematical contents on high cognitive levels that require the deployment of high order thinking strategies.” (OL, female, 49 years old).

A norm of collaboration in the personal aspect was expressed in the regular circles of discourse that exist during the ongoing sessions of the community. In the discourse circles the participants create an accepting, involving, supporting, and including atmosphere. In this framework, the teachers learn the language of emotional discourse and learn to share and receive help in the coping with difficulties, fears, failures, and dilemmas as well as successes, happiness, and pride in their work. The teachers shared this issue in the interviews, “From the conversation in the community I learned to accept emotional assistance that helped me release, share my feelings, thoughts, successes, and failures as a teacher.” (OS, female, 28 years old). Another teacher noted, “From the conversations in the community I understood that I am not the only teacher who suffers from problems or difficulties in my coping with the students in the lesson.” (RT, female, 48 years old).

The issue of class management is a critical point for the teacher. The teachers shared in the conversation circles about management situations of teaching: “The lack of motivation of students” (SL, female, 44 years old), “different learning disabilities” (ZA, female, 45 years old), and “behavior problems of different students in the mathematics lessons” (YB, female, 55 years old). The sharing is sometimes expressed in the conversation in the plenum when the instructor raised a certain issue for discussion and sometimes by teachers who came with a certain distress from the classroom. As one of the teachers said, “I learned to share, to be open to listen to suggestions of others when providing a solution to the differences in the class, I adopted my new behaviors as a teacher.” (GG, female, 40 years old).

In the discourse circles many conflicts arise and alongside them also ways of coping in situations of this type, such as “I shared with my colleagues situations from the everyday life in the classroom that inspire a psycho-pedagogical discourse. I brought up a conflict about an intelligent student who does nothing in the lesson. And there is no cooperation with the parents. The difficulty that I brought up in the community is: how to instill in him learning habits? As a young teacher, I felt that the sharing greatly helped me, I obtained from the teachers ideas about ways of coping.” (SH, male, 35 years old).

The framework of the discourse circles in the community creates a space in which teachers express and process emotions. Teachers noted in the interviews that the emotional conversation enabled them growth and development from the personal aspect: “In my work with the students I learned to accept every student as he is. I learned to muster patience, empathy, and acceptance.” (SM, female, 47 years old). “In meetings in the community we shared with one another copings with similar difficulties with students, this improved my interaction with the students.” (AE, female, 50 years old). Another teacher noted, “The emotional conversation helped me cope with personal, social, and learning problems in the class and improve my teaching from the emotional facet.” (OL, female, 49 years old).

From the findings in the aspect of involvement from the personal facet, it is possible to identify reciprocal relationships between the teachers that enabled emotional

accessibility and an appropriate space for the reinforcement of the strengths in them. This is expressed in the interviews. “In the conversation we shared experiences, we aired feelings, slowly the barriers were removed, and we felt that it is possible to converse with great openness, about all the gut feelings that arose during the year.” (SA, female, 30 years old). Another teacher shared this aspect: “The ability to express emotions in the community calms me and gives me the powers to continue, I seek to continue with these discourse circles as emotional ventilation.” (IV, female, 42 years old). Another interesting thing that is expressed in interviews is the involvement in the ways of coping in a pressuring and conservative system. “As an experienced teacher, I identify that my colleagues share their ways of coping, the distresses that trouble me too, such as pressures and requirements of the principal or the supervisor.” (SL, female, 44 years old).

Alongside moments of discomfort and the difficulties that arose in the interviews it was possible to identify the voice of the teachers also in the experiences of success, pride, and feeling of efficacy. The sharing in successes creates a positive atmosphere and good feeling of the teachers about their work in the class. A teacher did well to express this issue: “I obtained the courage to build a lesson based on inquiry activity at different levels, the students noted to me that this lessons was one of the special lessons, and this is because of the reinforcements I received from the community members about my work.” (OS, female, 28 years old). A teacher added, “In my opinion, success is not only an objective but also a belief in my ability as a teacher to attempt to change conservative patterns in the ways of my work.” (AF, female, 42 years old). The teachers expressed praise for on another in the sharing of their successes. “In the feedback that I received from my fellows I felt professional appreciation and strengthening of my successes during the year.” (DH, female, 38 years old).

In the aspect of successes, the teacher needs experiences that reinforce her “self” as a part of her professional development. The sharing in the emotional space that is expressed in the group enables observation and conversation on her emotions among her colleagues. After the teacher speaks about her emotions, listens to them, obtains support and tools for coping, the possibility of change opens in her. In the professional learning community

norms of sharing are created especially in the discourse circles that are after the observation lessons. The teachers shaped their learning experiences as a group and as individuals, or in other words, each one learned together and learned separately.

From the content analysis of the interviews it is apparent that the **teamwork** is an accepted norm in the community. This norm is meaningful for the teachers in the process of the building of a collective group. The teachers move from individual work that is performed in isolation to teamwork. The teamwork in the professional learning community is characterized by cooperation, focus of the group's powers, and a large degree of reciprocal dependence, which is directed at the achievement of the goal of lesson study in the process and implementation of teaching practices.

From the interviews it is possible to identify that teamwork required the commitment of the community members and a sense of belonging for the purpose of the making of decisions in shared activity. The teamwork is based on values according to which the community members chose to act in the field of interpersonal relationships in the team, such as basic trust, collaboration, mutual coordination, support, and assistance alongside agreed-upon norms. The community of the teachers has a unique environment that allows the formation of processes of professional and personal growth. In the interviews the teachers overwhelmingly addressed the contribution of the teamwork in the community in the pedagogical facet and in the social facet.

The contribution of the teamwork in the pedagogical facet is expressed in the identification and development of learning approaches and their analysis. A teacher described her contribution from being a partner in the teamwork. "We worked in close cooperation, we planned lessons in cooperation, we implemented diverse learning methods and we adjusted them to the diversity in the class." (RT, female, 48 years old).

In addition, an experienced teacher, 21-30 years of teaching experience, noted "Today we are a team and not a group of teachers, the cooperative learning contributed to me to identify together with my colleagues unique teaching practices." (YB, female, 55 years old).

Teamwork included the analysis of the mathematical dilemmas and the solving of problems that were identified in the observation lessons, so as to cope with the teaching challenges and to make them into opportunities for learning. The mathematics coordinator noted, “The teamwork enabled me to analyze teaching situations and exposed to me different ways for coping with these situations. As a coordinator, I wisely conveyed my insights to the staff of teachers in my school.” (OG, male, 38 years old). A teacher with 1-10 years of teaching experience emphasized the pedagogical contribution of the teamwork in the ability of coping with complex tasks. “The cooperative learning awakened in me critical thinking on the effective use of activities of high order of thinking.” (SR, male, 34 years old). The teamwork in the community constituted for the teachers a significant professional anchor in the innovative teaching ways. This was expressed in the following quotes. “I acquired new ways of teaching and I learned to convey the contents in an experiential manner.” (IL, female, 38 years old). “We analyzed together mistakes of students.” (SL, female, 44 years old). “We discussed expected strategies of students in the solving of problems.” (GG, female, 40 years old). “We asked questions that advanced us in the optimal planning of the lesson.” (AI, female, 30 years old). “In the teamwork we shared professional knowledge and instructional experience that made us into more experts in the teaching of mathematics.” (OL, female, 49 years old).

The contribution of the teamwork in the social facet is expressed in the building of an environment based on trust, cooperation without competition or judgment, open communication, and mutual respect. It is possible to indicate examples from the teachers. “As the frequency of the meetings between the team members increased, our commitment and motivation to support one another strengthened.” (SS, female, 60 years old). “The teamwork caused me to see the staff of the community as one entirety and not as a collection of teachers from different schools.” (ZA, female, 45 years old).

It is apparent from the teachers’ statements in the interviews that in the teamwork many values were assimilated. The teachers in the community gave a personal example of patience, lack of judgment, mutual respect, and sense of collective responsibility. “I felt a partner in the staff and I knew to include the insights of my friends.” (SB, female, 40 years

old). “I felt strengthened and I received inspiration from the observation lessons.” (AF, female, 42 years old). “I experienced a feeling of belonging, giving, and contribution in the teamwork.” (IV, female, 42 years old). The teamwork develops among the teachers social skills. The teachers noted in the interviews that the teamwork is meaningful for them in the social facet. “The participation in the community taught me how to behave more correctly in the teamwork, developed in me social skills and management skills.” (SL, female, 44 years old). “The teamwork allowed me to know the team members from different perspectives and to learn to work with each and every one.” (GG, female, 40 years old).

The teachers emphasized in the interviews that the teamwork in the community created for them a satisfying and challenging learning environment that creates new environments for learning. This issue was expressed in the following quotes. “We built group work programs and we knew to use the strengths of all the group members.” (SM, female, 47 years old). “The learning in the community strengthens the work relationship and the fabric of interpersonal relationships, thus leading to broader cooperative activity, productive and significant learning.” (IL, female, 38 years old).

Norms of teamwork in the professional learning community enable the teachers a sense of belonging and social and pedagogical empowerment.

It is apparent from the content analysis of the interviews that **peer learning** is a central norm in the community. This norm is based on the learning from peers and with peers. It enables the sharing of knowledge, the conceptualization of pedagogical ideas, and experiences while providing emotional support for one another.

According to the constructivist approach, the learning process is a process of the building of complex knowledge, in which the teacher is in the center and has an active role in the building of the knowledge she learns. Peer learning is learning that occurs in a group of learners who assemble around a shared topic so as to improve their knowledge and thinking (Wasik & Hindman, 2011). The teachers attributed considerable importance to peer learning in the framework of the community and noted in the interviews that peer learning empowered them in the joint planning of lessons that they held in the classes.

After the lessons, the instructor conducted a pedagogical discourse based on critical thinking and profound understanding of the contents and concepts that were expressed in the lessons that the teachers taught in their classes.

The content analysis of the interviews indicated three characteristics of peer learning in the professional learning community:

1. Active learning
2. Re-examination of the teaching practices
3. Instrument for empowerment and professional development

Peer Learning as Active Learning.-This learning provides the teachers with a framework for active experience in which the teachers are involved in observation in the lessons and in their analysis. In this learning, the teachers display joint responsibility for the learning and the growth of the shared knowledge. This issue is expressed in the interviews. “Lesson study helps the whole group learn from one another, draw conclusions, insights, and ways of increasing effectiveness in the lessons.” (OL, female, 49 years old). “Peer learning enables me to improve the teaching processes that lead to constant improvement of my work as a teacher in the school. I benefited from the knowledge of each and every one of the members of the community, both less experienced teachers and more experienced teachers.” (SS, female, 60 years old). “Teachers emphasized in the interviews the importance of reciprocal learning that is expressed in the peer learning, such as “peer learning was for me an opportunity for productive and fruitful learning.” (ZA, female, 45 years old). “Peer learning is a means for the creation of a meaningful and promoting conversation ... together we found creative solutions in teaching.” (SB, female, 40 years old).

Peer learning is characterized as active learning that enables the teachers to implement the knowledge they acquired during the lessons and in the discussions held after the lessons. The teachers in the community respect one another, trust one another, and share their knowledge. This learning creates a learning environment that enables interaction among the teachers themselves and between them and the environment. From the teachers’

statements, it is possible to identify that this characterizations recurs in a number of different ways. “I saw the conduct of the lesson live, in the natural environment of the students. This learning gave me a response to the teacher’s actions in the lesson, to the students’ answers, the learning environment of the class.” (AF, female, 42 years old). “I observed the lesson of a fellow teacher from the beginning to the end, I wrote for myself insights, such as which questions did the teacher ask? Did the use of the means of illustration promote knowledge? There is no doubt that as they learn more in the field and experience in reality, they assimilate processes of teaching as a part of the professional development.” (IV, female, 42 years old).

“I am exposed to different schools in different age groups ... I am exposed to teaching in another way ... non-routine lessons. In the community there is a meaningful process of peer learning, which does not occur in a regular in-service training course. In the lesson I observed, I documented the interaction between the teacher and the student, I listened to the components of the mathematical discourse that occurred in the lesson, and I implemented these components in the mathematical conversation with my students.” (SA, female, 30 years old).

Active learning intensifies when it derives from the teachers’ world through self experience and dealing with successes and difficulties. The teachers are aware of their thoughts, emotions, and behavior during the learning. The teachers initiate learning, derive information from their colleagues, adopt ways of learning, and make them flexible for the different situations in the classroom. A teacher with 1-10 years of teaching experience described that he learned from a more experienced teacher. “In the lesson the teacher illustrated for us how to deal with students who have difficulties. His great experience gave me directions and ideas from which I grow and implement in the class that I teach.” (OG, male, 38 years old). In addition, another teacher emphasized her learning as a mathematics coordinator. “The lesson of the mathematics coordinator offered me correct use of mathematical concepts, revealed to me different thinking strategies that I implemented in my classroom.” (AE, female, 50 years old). The active learning is expressed in the interviews also in the facet of the change of the teaching ways, such as “mathematics does

not change, in the community they find the magic in it, the teachers used ways of teaching that I did not know. We sat together and brought up points for thought and suggested different alternatives for teaching. What I do in everyday life – obviously becomes a treasure for somebody else.” (SB, female, 40 years old). “Peer learning enables me to learn in many aspects of the lesson, more than once I experience new ways of teaching that I learned from the teachers in the community.” (DH, female, 38 years old).

Peer learning as active learning emphasizes the teacher’s contribution in the community as a partner and as promoting learning, the personal responsibility alongside the mutual responsibility, and guarantee alongside involvement. The teachers cannot remain passive, they share with their colleagues and learn how to promote their learning and to contribute to their fellows.

Re-Examination of the Teaching Practices- Peer learning enables the teacher to re-examine the teaching practices so as to improve the teacher’s teaching ways. The discussions in the community enable the teachers to share the ways of teaching, to share between them, to research and to develop shareable teaching knowledge products. This knowledge includes internal knowledge, external knowledge, and a variety of points of reflection for different observation on ways of teaching and re-examination of the teaching processes. This knowledge constitutes for the teachers a basis for real changes in the teaching practices and enables the acquisition of teaching abilities in different contexts. This idea was expressed in the teachers’ statements in the interviews. “Peer learning enabled me to understand processes and decisions that I made in the lesson in retrospect, for instance, I had mistaken judgment in the choice of assignment for students with difficulties. After the analysis of the lesson in the community, I understood that I need to map the knowledge required for the understanding of the task.” (IL, female, 38 years old). “The pedagogical discourse following the lesson was very fruitful, it caused me to reconsider the way in which I taught a lesson of geometry, this conversation opened for me opportunities for renewed learning. The fellow teachers offered to me a variety of ways to illustrate to the students the area of a rectangle while I as a young teacher adhered to the formula for the calculation of the area. This learning caused me to reconsider the way in

which I am teaching. It is clear to me that the next time I will teach this topic I will use these teaching practices.” (AI, female, 30 years old).

In the professional learning community there is an inquiry-based practice that is characterized by a continuous circle of the definition of need or problem, description and analysis of the problem, and identification of alternatives for implementation and assessment. This process is based on the in-depth analysis of data that encourages the multiplicity of viewpoints and critical thinking. The teachers described this process in interviews. “In the community we held an open dialogue. On the one hand, an honest and nonjudgmental dialogue and on the other hand an investigative one. We were careful to differentiate between facts and opinions and interpretations, we revealed different layers of teaching, not only strengths but also weaknesses.” (RT, female, 48 years old). Another teacher described this: “I remember especially the analysis of a notebook of a student we analyzed in the community in the attempt to understand the nature of his mistaken perceptions, how to build for him a work plan, and especially how to improve our own teaching. The analysis of the student’s notebook opened before us an excellent opportunity for learning from errors.” (SR, male, 34 years old). Following the observation in the lesson, the teachers in the community discuss a certain situation related to the teaching-learning processes. In a pedagogical discourse held after the observation lessons, the teachers examine different possibilities of relationships, causes, and effects before judgment and suggestion of solutions. These discussions shape the way in which the teachers understand the reality and think about the ways to cope with challenges in their work. The teachers present new ideas and go in-depth in their understandings of the nature of the teaching.

From the content analysis of the interviews, the teachers noted examples of the examination of the ways of teaching. “The work routine in the community was to analyze the learning events. I especially remember a learning event in which I learned how to plan a lesson with high order thinking tasks in which the students conceptualize the new knowledge.” (OL, female, 49 years old). A senior teacher with 21-30 years of teaching experience noted that, “The learning from the fellow teachers offered for me a re-thinking of my ways of teaching in an answer to differential teaching.” (SL, female, 44 years old).

The teachers in the community created routines of re-examination of the teaching ways to which they were exposed during the observation lessons. These routines addressed not only the teaching methods but also the teachers' ability to identify diverse ways of teaching and implement them in their work. The goal is that as the teacher can convey the knowledge acquired to the real teaching situations, such as the planning of lesson plans the use of digital instruments and teaching assignments, and the examination of practices, the implementation of the lessons and teaching products enables the identification of difficulties in the lessons and the suggestion of alternatives in the teaching. In addition, it improves the teaching activities and offers teachers information that helps them improve their lessons. It is possible to identify these routines and their contribution in the content analysis of the interviews. "In the pedagogical discourse we examined regularly the goals of the lesson, the organization of the learners' time, and the level of performance how these points were expressed in the lesson? Did the teacher succeed in achieving the lesson goals? Was the teacher supposed to teach differently? What was good in the lesson and what was less good? We learned from one another and we enriched ourselves with mathematical and pedagogical knowledge, thus leading in the end to the improvement of the students' achievements since our teaching became better." (SB, female, 40 years old). Experienced teachers, with 21-30 years of teaching experience, emphasized in the interview the importance of these routines in the community. "This is the first time that I was exposed to and experienced peer learning so meaningfully. In the community we discussed the added value of the use of digital instruments as a means of illustration for the improvement of our ways of teaching. Following the discussion I began to implement these techniques." (YB, female, 55 years old). "Without the constant discussion of the students' mistakes and the previous knowledge the students need for the learning of the topic, I would not succeed in promoting the students who have difficulties." (ZA, female, 45 years old). In the interviews, the teachers presented insights about their ways of teaching and shared how they integrated and adopted their colleagues' ways of teaching in their lessons. "Sometimes the pedagogical discourse caused me to doubt my teaching and therefore I was happy that the community members offered me better teaching alternatives and teaching ways or techniques that I had not thought about at the time of the planning of the lesson." (SM,

female, 47 years old). “The joint analysis of the lesson enabled me to focus my students’ difficulties on the multiplication of simple fractions and to extend my repertoire of instruments to help them overcome these difficulties.” (AE, female, 50 years old). Another example expresses this idea: “I was exposed to a teacher who gave every child a navigation card that details stages in the writing of an explanation, in addition in the discussion that was held after the lesson we discussed with the teachers the rationale and importance of the use of the navigation card. I understood that to help my students better explain, it is important to me to adopt this way of teaching.” (SS, female, 60 years old).

To conclude, peer learning provides an opportunity to re-examine the teaching practices, to promote processes of teaching and learning, and to promote the teacher’s pedagogical expertise: interpretation, repertoire, and professional judgment.

Another characteristic of peer learning is empowerment and professional leveraging. Learning in this way constitutes a tool for the empowerment and professional development of the teacher. In the professional learning community the teachers experience many processes. One of the meaningful processes in peer learning is a process of the empowerment of teachers that includes a feeling of efficacy and trust in their ability to make decisions and to resolve issues that arose following the observation lessons.

The process of empowerment is influenced by the changes that the teacher experiences in the community, from a teacher who works alone in her classroom to a teacher who shares and works in a team. The teachers who connected to the research community were teachers who had experienced professional isolation, or in other words, every teacher worked individually. One of the goals of the community is to create a community that works in a team and cooperates.

In peer learning the teachers are empowered during the educational activity: in the lesson study, in the observation of the lessons, in the analysis of observations, in the pedagogical discourse, and in the drawing of conclusions. The components of the sense of empowerment in the educational activity express internal and external processes that the teacher undergoes in her perception of self and in her reference to her environment. The

internal process is associated with emotional and psychological aspects. In other words, the teacher experiences a feeling of efficacy, motivation, and commitment to give an accounting on her actions, to deal successfully with the making of decisions and with professional problems connected to the world of the classroom and the school. A teacher with 1-10 years of teaching experience noted in the interviews that he acquired in peer learning tools and a bank of ideas that empowered him personally and professionally. “The pedagogical discourse gave me confidence, strength, tools for planning good lessons in my class and for a sense of efficacy.” (SR, male, 34 years old). In addition, a mathematics coordinator described that “my self-confidence increased in that the members in the community reflected to me that I am giving my students a diverse and rich learning environment, listening to every student, and enabling him to advance at his personal pace.” (SA, female, 30 years old).

The external process is connected with applied and behavioral aspects. In other words, an empowered teacher is a teacher who learns, renews, deals with an environment rich in knowledge and acting to apply knowledge and skills acquired in the process of development and growth. In these processes the teachers acquire high self-awareness of themselves, the community, and the work environment in the class and in the school. In the interviews, it is possible to identify teachers who noted these applied aspects, such as “After the observation of my lesson we managed a relevant conversation on the lesson. I understood that there is not always an added value to the use of a technological instrument in the lesson. This conversation advanced me in the dealing with new situations in the lesson.” (AF, female, 42 years old). “I feel a strong improvement in my work. I share the staff members in my school with up-to-date teaching skills that I acquired in the professional community in which I am a partner.” (IV, female, 42 years old). From the perspective of a teacher in the community with 1-10 years of teaching experience, it is possible to identify professional empowerment. “The shared conversation following the lesson raised in me insights that are important to me as a teacher, I became more investigative and more creative.” (OG, male, 38 years old).

In the peer learning, the teachers in the community address challenges and obstacles as an opportunity for learning and professional development. It would seem that the obstacles, difficulties, and lack of successes may harm the teacher's empowerment and erode her sense of personal efficacy. The discussions in the community are based on successes but also on the challenges of teaching, difficulties, and even failures. These discussions constitute wonderful opportunities for the reinforcement of the sense of personal efficacy and the leading of the teacher to meaningful learning. All this is done in an inclusive and respectful atmosphere, nonjudgmental, from a place of strength and personal and individual growth, and not from surrender or compromise. A teacher emphasized in the interview that failure in teaching actually empowered her. "I failed in the lesson, the students were not attentive, and I ended the lesson. The instructor reflected to me my behavior in the lesson, which empowered me professionally since the community members suggested to me alternatives for action in similar situations." (AI, female, 30 years old). In addition, an experienced teacher, with 31-40 years of teaching experience, shared her difficulty with teaching geometry. "I very much wanted to teach geometry in an interesting and immersing manner, with enthusiasm and desire. The teachers in the community presented to me creative ways of teaching geometry with the integration of teaching aids from everyday life. These ideas allowed me to cope and even to enjoy the teaching of geometry." (SS, female, 60 years old).

It is possible to identify from the analysis of the findings in the interviews that the teachers expressed the way in which they were empowered in the acquisition of knowledge in a critical way and in the ability to reduce the dependence of one another in the community. This empowerment enables growth and renewal in the teacher's professional development. The teacher described it as follows. "In the community I discovered my strengths in the pedagogical facet. The discussions in the community created for me the opportunity to learn from other teachers diverse teaching methods. I have high motivation and I am confident that with consistency, perseverance, and pedagogical abilities I will succeed in coping on my own with the challenges in my work." (GG, female, 40 years old).

The empowerment is a personal process that occurs in the group. This process expresses a meaningful part in the teacher's professional development. The goal of the community is to train intellectual teachers, who research and create, who believe in their ability for constant improvement. The empowerment of the teachers in the community is the key to the school improvement.

To conclude, peer learning in a professional learning community creates learning of new knowledge and enables cooperative teaching for the constant pedagogical improvement of the teachers, by the teachers, for the teachers.

6.6 Role of the Instructor

The role of the instructor in the professional learning community is to lead staffs of teachers, to shape their professional look, and to create a collective pedagogical language for professional discourse. The instructor is attentive and understanding and examines the principles of productive pedagogical discourse and adapts them to the group members. She knows the members of the community and the power relations among them and makes certain that in the community the place of both the new teachers and the experienced teachers is maintained. The instructor of the community cultivates trust and systems of relationships between the community members and as needed intervenes to influence the dynamics in the group (Lieberman & Friedrich, 2010). The teachers noted in the interviews that the instructor was a central and significant figure for them, a figure that accompanies them in the processes they experienced in the community.

The analysis of the content of the interviews in the aspect of the instructor's role identified three dimensions: accompaniment of the learning processes, personal accompaniment of teachers, and accompaniment of team processes.

The instructor's role is expressed in the interviews as **accompanying the learning processes** of the teachers in the community. The teachers noted that the instructor of the community focuses on the management of the teamwork and the leadership of productive pedagogical discourse. "The instructor's role is to manage the conversation meetings, to

focus so that we do not scatter about but also to display flexibility if the need arose to discuss a topic that was not planned ahead of time.” (OG, male, 38 years old). “The instructor invited processes of observation in the observation lessons and managed a conversation that engages in teaching and learning following the lessons.” (DH, female, 38 years old). “The instructor helped us define the issue, dilemma, or problem that the teachers encountered during their teaching.” (SR, male, 34 years old).

The teachers emphasized in the interviews that they learn from the instructor how to observe lessons from an inquiry-based perspective. In addition, they noted that they learn to identify components of the pedagogical discourse of a mathematics lesson that include engagement in and analysis of the practices of teaching, ways of explanation, and repertoire of alternatives for ways of teaching. An experienced teacher with 21-30 years of teaching experience described: “In the pedagogical discourse on the topic of alternatives in teaching the instructor of the community emphasized the importance in the implementation of teaching alternatives. In addition, the instructor focused on the advantages and disadvantages of each one of these alternatives.” (SL, female, 44 years old). The instructor helps the teachers extract appropriate issues for discussion and teaches them to conceptualize mathematical concepts and ideas. The teachers best expressed this idea. “The instructor held a fruitful pedagogical discourse, examined the issues that arose in the conversation, and encouraged us to think about additional perspectives that had not arisen in the conversation until now.” (IL, female, 38 years old). “During the discussions the instructor conceptualized the new knowledge I acquired in the community and refined the mathematical ideas that arose in the lesson.” (OL, female, 49 years old). The instructor encouraged processes of cognitive inquiry among the teachers in the community that led to meaningful insights so as to learn and improve the teaching ways.

The instructor’s role is expressed in the interviews as **accompanying personal processes**. The instructor supports, empowers, and develops partnerships among the members of the group. This personal accompaniment is intended to provide security and to develop self-efficacy in the teacher. The less experienced teachers as well as the more experienced teachers described this as follows. “The instructor of the community gave us

confidence and power. She calmed us down and lessened fears about peer learning, thus causing us to hold additional lessons without fear.” (SM, female, 47 years old). “She allowed us to say everything ... without being afraid that things are not appropriate, not smart enough ... we held with her a true conversation, at eye level, we were not afraid of anything that we wanted to say or share.” (SR, male, 34 years old). “The instructor calmed me, she was not judgmental and did not exert pressure ... she conveyed that she believes in me and in my abilities as a teacher.” (OS, female, 28 years old).

The giving of a sense of security to the teachers is expressed in the interviews in the instructor’s ability to accompany and empower the teachers in the community in personal terms. They expressed this idea well. “The instructor gave a sense of confidence to the members of the community during the teaching of the lesson. This feeling caused me to invite additional teachers from my school to observe my lessons and the classroom door was opened to them.” (AI, female, 30 years old). “My school hosts teachers and supervisors frequently. Since I am a part of this community, I gathered courage to model lessons, I have no doubt that the instructor has a considerable part in the gaining of this confidence.” (IL, female, 38 years old).

Another role of the instructor that was identified in the interviews is the development of independent teachers, who learn and are reflected. One teacher put it well: “At first I was greatly helped by the instructor, I shared with her the planning of my lesson, the instructor offered me ideas to improve the lesson. These ideas we attempted together in another small group, we drew conclusions and improved the lesson before the teachers in the community observed it. Slowly I learned to do this alone as well, before every observation lesson I attempt to teach a different group the lesson and to draw from it insights for the next lesson.” (AE, female, 50 years old).

The instructor was concerned about the personal development of every teacher in the community as an individual. She displayed personal empathy with every teacher in the community, listened to their needs, and included every teacher according to need. A teacher described it as follows: “The instructor of the community evinced empathy for our

emotions, attempted to observe from the teacher's perspective." (GG, female, 40 years old). Another teacher noted that, "The instructor was accessible and available also beyond the hours of the in-service training ... she helped us in each and every matter, with every question or problem that bothered the teachers, whether this was planning the lesson or the dynamics between the team members." (SH, male, 35 years old).

In addition, the instructor held personal conversations, feedback after the lesson, and identified among the teachers strengths and personal abilities. The instructor supported the asking of questions more than the response of answers, with the integration of challenge and support.

This idea was expressed in the following quotes. "The instructor identified my strong points during the planning of the lesson together, she discovered my teaching abilities, and thus I improved my teaching ways." (DH, female, 38 years old). "The instructor supported giving positive reinforcements and encouraging the person holding the lessons, she always had warm and good words when necessary." (OS, female, 28 years old).

The members of the community found a listening ear with the instructor and felt safe in seeking her counsel at all times. This idea is expressed among the teachers. "The instructor was for me a figure for consultation in every professional or personal topic related to the teaching of mathematics. She provided me with a listening ear and provided me with a comfortable and pleasant source for consultation without fear." (AI, female, 30 years old). "The instructor who accompanied us during the in-service training was pleasant, attentive, and professional. She gave me the feeling that it is always possible to turn to her and ask her advice." (AF, female, 42 years old). "The very fact that the instructor is an actual teacher, I feel that the instructor is not disconnected from the reality, displays empathy, contributes to me from her pedagogical experience." (RT, female, 48 years old).

Another role of the instructor is expressed in interviews as **accompanying processes of staff learning**. The instructor establishes relations of trust, norms of cooperation, organizes a learning setting, and identifies the group dynamics. This is

expressed in the following quotes. “The instructor helps us work in teams during mutual productivity.” (SL, female, 44 years old). “The instructor offered for us a place for a meeting of peers based on mutual understanding, a place where the teachers feel empathy, recognize the emotions and thoughts of others, and attempt to identify with the internal experience of each and every teacher.” (IL, female, 38 years old). “The instructor created a learning culture of cooperation and public teaching. She instructed the pedagogical discourse while preserving the rules of ethics in every observation lesson.” (OL, female, 49 years old). In the pedagogical discourse, the instructor emphasizes the rules of conversation, such as use of representations and evidence from the classroom, description of the lesson before it is analyzed, without judgment. Thus a teacher described it: “The instructor takes upon herself the responsibility that the peer learning will be performed without judgment, she acts according to all the rules of ethics of pedagogical discourse, more than once the instructor corrected us not to judge but to describe what we saw in the lesson.” (SA, female, 30 years old). Active listening is a central step in the perception of the role of the instructor of teachers in the community as accompanying team processes with the understanding of the language of the group and with interventions of instruction of the instructor in the pedagogical discourse. This issue is expressed in the following quotes: “The instructor caused everyone to be partners – she gave room to everyone, created norms of listening, respectful conversation” (SL, female, 44 years old). “The instructor created a shared language for the group, gave a feeling that we are all equal. Acceptance and respect of each and every one.” (GG, female, 40 years old). The instructor led the community in a pleasant manner, not condescending, the discourse that she managed was at eye level, and gave the feeling that we all are partners in the same task.” (SM, female, 47 years old).

The instructor’s role is characterized in the interviews as a source of inspiration and is meaningful to teachers in the community. The instructor’s ways of instruction determined largely the relations that reigned among the group members and the processes that occurred in it. The instructor channeled these relations so as to promote a fruitful pedagogical discourse in the professional learning community.

6.7 Challenges in the Processes of Teaching and Learning of the Teachers in the Professional Learning Community

This chapter presents the challenges in the processes of teaching and learning of the teachers in the professional learning community. From the content analysis, the interviews identified difficulties and weaknesses that arose in an honest and true manner from the interviewees. The challenges in the processes of teaching and learning in the professional learning community derive from the exposure of the teachers to a new community, from an individual work culture to a cooperative and critical work culture. In the community the teachers are exposed to norms and values such as collaboration, teamwork, culture of critical discourse, and reflection.

The teachers shared in the interviews not only strengths and successes but also challenges they experienced in the community. The challenges that were expressed in the teachers' statements are the creation of interaction in the community, peer learning, competition, and creation of cohesion and belonging.

A main challenge that arose from the teachers' statements is the **creation of interaction in the community**. This challenge relies on the new paradigm that the teacher in the community experienced as a partner in the professional community. The creation of an interaction in the community is a gradual process. The construction of the meetings is undertaken from the general to the specific, from the group to the personal. In this process emphasis is placed on the construction of norms and a safe and inclusive community climate, which enables coping with difficulties and willingness to be a part of the group. This process changes from teacher to teacher in the community. This issue was well expressed by teachers in the following quotes. "The community was a mixed group of religious and secular teachers, I did not feel that between us a real interaction was created. I did not succeed in creating a real relationship with the secular teachers although we spoke between us eye to eye and we engaged in shared issues." (SS, female, 60 years old). "The acquisition of trust and intimacy in the community is no small matter. This takes time ... until this happens there is no true openness." (YB, female, 55 years old). A teacher with

experience of 1-10 years added that, “At the start of the year the school staff managed as a closed group of its own. This was expressed both in the workshop and in the shared conversation. During the year the boundaries were shattered in that the discourse became shared and relations of trust between the community members. I felt that an empathetic group was created.” (ZA, female, 45 years old).

In the interviews, the teachers brought up their difficulty to open up and be exposed in the community. They emphasized their feeling of confusion in the exposure of situations from the life of their class and fears from the negative criticism. This issue is apparent in the teacher’s statements. “Between the community members I identified difficulties, primarily in the first meetings, the teachers felt discomfort to share personal difficulties or to present cases that may be perceived as unprofessional or cases that may be seen as teachers lacking knowledge or lacking great experience in the teaching of mathematics. Slowly the fears of group members in the community of the learners lessened.” (OL, female, 49 years old). Another teacher described, “I would be happy if the number of teachers that observe me would be smaller and the circle of conversation after the lesson would be more intimate. I was confused that they observed me and also later on in the reflection that I received from my peers I felt threatened, it is difficult for me to develop an in-depth and meaningful discourse in the large group.” (SL, female, 44 years old).

Another challenge that arose from the content analysis of the interviewees is the **fear of peer learning** in the community. The teacher’s work in the school is for the most part characterized as an individual and autonomous work. The teachers noted in the interviews that the peer learning, observation of the lesson, and lesson study became routines in the professional learning community. In addition, the teachers made their teaching practices public: they presented their ways of teaching and discussed them as observers from the outside. These routines awakened among the teachers difficulties that entail great exposure, the adoption of risks, and the receiving of criticism. The statements of the teachers in community indicate that this process is perceived more than once as invasive and threatening. “In the first meetings I felt that there was a free and unfocused discourse. The teachers felt uncomfortable with criticizing the lesson. We did not engage

in the study of the teaching of ourselves ... I did not feel that a meaningful discussion was held ... slowly slowly we learned to document what we expected and we gave accurate feedback and concrete reflection.” (SM, female, 47 years old). “In the discourse conversations following the lesson there were cases where I identified that the teachers found it difficult to receive feedback following the lesson and to receive alternatives in the teaching ways. I felt on their part defensiveness.” (SA, female, 30 years old). Teachers described in the interviews that the peer learning constituted for them exposure that encouraged constant criticism, such as “...I evaded holding a lesson in the community since I was afraid of the criticism of my peers on my ways of teaching and harm to my image as an experienced teacher.” (DH, female, 38 years old).

Competitiveness is another challenge that is expressed in the teachers’ statements in the interviews. From the content analysis of the interviews, the teachers described the community as a cooperative group but also as a competitive group. The competition is expressed in the desire to achieve unique and innovative teaching methods. Teachers described the tension that existed between different schools. This was especially apparent in the pedagogical discourse in which teachers were required to give feedback to teachers from their school staff. The teachers said, “In certain meetings I felt an implicit competition. Competition over achievements, upholding the school name, and representing the school appropriately. More than once teachers attempted to beautify things, to slide into a shallow and non-critical conversation when they discussed a certain issue.” (SM, female, 47 years old). “In the first meetings of the community, I felt competition between the schools that are participating in the community. Every school attempted to present itself as a more innovative and better school. Today each and every one of the teachers contributes to the community from her experience in teaching and the benefit belongs to all of us. We put the competition to the side so as to promote many processes.” (GG, female, 40 years old). Another teacher described, “Sometimes I felt the suspiciousness of some of the community teachers. Not all the community members shared honestly the teaching experiences and difficulties in everyday life in the class, perhaps since the relations of trust were not sufficiently based and perhaps this is a type of competitiveness between schools

– lack of true cooperation and lack of honesty so that the school will look its best.” (YB, female, 55 years old). The competitiveness in the community of teachers is expressed also in the interaction between younger teachers and more experienced teachers in the community. A teacher with 31-40 years of experience expressed this issue well: “I came to the community with lots of ego. During the year the relationships between me and the teachers in the community became established. I learned to accept advice also from teachers who are younger than me. In addition, today I see the success of another teacher to be my success.” (SS, female, 60 years old).

The teachers shared in the interviews their collective challenge and the desire to create **cohesion and belonging in the community**. The community began its activity as a heterogeneous group. The teachers in the community are different from one another in terms of their teaching experience, their role, and their professional training in the teaching of mathematics. In addition, those who come to the community are teachers from different religious and state schools. The teachers noted in the interviews that they are different from one another in their needs, ideas, and experiences and therefore they have different preferences. They described differences in their thinking and learning styles. Therefore, the significant challenge that the instructor and teachers face is to create a group with social cohesion and shared language that promotes meaningful learning alongside the preservation of the teachers’ autonomy and creativity. In the interviews the teachers described the heterogeneity of the group and noted processes that occurred in the group, so as to create a productive pedagogical discourse that promotes learning and teaching. “One of the challenges of the community is work in a heterogeneous group of teachers. In the community there were different and diverse teachers, more professional and less professional, young and old. In the community there were also novice teachers or alternatively teachers who less like sharing and participating. The discourse in the community needed to be adjusted and relevant to all the teachers, to a broad common denominator.” (RT, female, 48 years old). At the start of the year the relationships between the teachers were lax, we had many differences in opinion. The participation in the community was an experience of professional and social learning, the activity in the

community formed around empowerment of practices of learning, teaching, and assessment, slowly we became a united group with a shared repertoire that includes routines, pedagogical tools, ways of action, and concepts.” (SA, female, 30 years old). Another challenge that arose from the teachers’ statements in this context is the creation of a shared professional discourse: on the one hand, to give the teachers a place for the multiplicity of their voices as individuals but on the other hand simultaneously to preserve a certain level of cohesion in the community. It is necessary to create an in-depth and rich discourse that overcomes the tendency for conformist thinking (groupthink) so as to prevent shallow professional discourse. The teachers described this, “In the community I gathered the courage to share my insights from the observation lessons, to say my piece honestly and matter-of-factly. Even when there was no collective agreement with my ideas.” (AI, female, 30 years old). “I encountered teachers who found it difficult to express open feedback on their peers’ work and were satisfied with weak criticism (talk safe). This criticism missed its goal since the teachers relied on the superficial evaluation and did not hold a meaningful dialogue that gave us a productive discourse.” (SB, female, 40 years old).

This chapter of challenges in the processes of teaching and learning of the teachers in the professional learning community represents processes in the professional activity for the creation of interactions between the teachers that entails the peer learning alongside the coping with competitions in the group.

Chapter VII: Discussion

The objectives of the research study were:

1. To identify the teaching-learning processes that contribute to the knowledge and professional skills of teachers who belong to a professional learning community.
2. To examine how peer learning influences the professional and personal development of the community members according to the lesson study model.

The group chosen for the research was a group of mathematics teachers in elementary schools who participated in a professional learning community, from the focus on the model of peer learning according to the lesson study model, as aforementioned (Hiebert & Grouws, 2007).

The process of professional development is based on the practice and reflection of the teacher in the education system, and hence it lasts throughout the teacher's career. In most of the countries of the world and in a range of professions, the perception that is steadily becoming prevalent is that the learning throughout the career does not end, it is lifelong learning, and the workers continue to develop in professional terms perpetually (Laal & Salamati, 2012).

Learning in a professional community furthers the depth of the teachers' knowledge and develops and improves their abilities, and its products gradually penetrate into the classes and the teachers' rooms (Herut, 2018). The learning communities are characterized by social structures that cause learning, or in other words, the learning process is entrenched and anchored in them and creates social interactions (Wenger, 2007).

This research study followed after the formation of the professional identity of the teachers who participated in the community and examined the development of their personal and professional self-efficacy, with the goal of promoting the learners' achievements. The research study also followed after the change of consciousness that occurred among the participants, as well as after the building of knowledge, the formation of norms of cooperative learning, and the cultivation of a pedagogical discourse.

The first part of the discussion will describe the process of the research interviews, the attitude of the researcher and the research participants, and the system of relations between them. This part constitutes an important basis for the understanding of the research study, since the interactions between the colleagues who are partners in the learning community are closely related to their professional development.

The second part of the discussion will present a comprehensive picture of the findings as a response to the research questions. The findings will be accompanied by a summative interpretation and a discussion, which are based on the theory and researches in this field.

7.1 Research Interviews

In this part, I will describe the process of the interviews from the perspectives of the researcher and the research respondents and from the aspect of the interaction between them. The interviews were held at the end of the activity of the professional learning community at the end of the 2017 academic year. The researcher presented to the community members the research study she is carrying out on the topic of the professional development of teachers through lesson study.

At the start of the interview, the researcher explained to the teachers that the aim of the interview is to collect data about their professional development as a part of the process of lesson study in the framework of the professional learning community. The goal of the interview was to enable the respondents to describe, to share, and to present insights on their being a part of the professional learning community.

The researcher presented to the community members an informed consent form and emphasized that the interview is anonymous and their responses will be used solely for the purpose of the research study. After all the members of the community signed the form, the researcher's feeling was that the community members were partners in the research study fully and without objections.

The interviews were held in the months of July and August, aside from two teachers who were interviewed in June in the hours of the evening after the workday. The choice to interview in this period derived from the optimal timing: near the end of the period of activity of the community, the participants' knowledge and insights are easily extracted, during the summer vacation the availability of the community members is relatively high since there is no load of school assignments, and they are more relaxed. In this period, the researcher is also more available since she is an instructor in schools and a mathematics teacher. For the researcher, the two interviews that were held in June were the interview guide, which enabled her to be precise and make slight changes in the phrasing of the questions, primarily those that engaged in her role as an instructor and in peer learning.

The researcher held a preliminary conversation with the research participants to coordinate expectations. In this conversation, the researcher explained that the interview lasts about two hours and is composed of open-ended questions. The researcher emphasized that the interview is recorded, asked the participants' permission to use a recording device, and noted that if there is objection to the recording, then it is possible to transcribe the interview. The researcher clarified to the participants that they were to answer the questions from a perspective that reflects their personal experience. The researcher thanked the participants ahead of time for their cooperation and their contribution to the advancement of knowledge in the topic. The choice when and where to hold the interview – in the researcher's home, in the interviewees' home, or in a neutral place – was given to the interviewees. Most of them chose to hold the interview in the evening at their home. The interview was held in a quiet room without disruptions and distractions, and the researcher used the recorder to ensure the accuracy and integrity of the details.

The researcher felt that the teachers were welcoming, made the required time available, and avoided engaging in other things during the interview.

7.1.1 Attitude of the Researcher

The researcher is a teacher of mathematics in elementary schools and an instructor of a professional learning community, when some of the members are teachers that the researcher instructs in the morning hours in their school and some of them are teachers who work a colleague instructor. The objective of the research study was to investigate the processes of teaching and learning, to identify characteristics of peer learning and lesson study in the pedagogical discourse, and to examine how all these influence the professional and personal development of the teachers in the professional learning community.

As somebody who belongs to the education system, the researcher knows from up close the lifestyles and culture, the beliefs, the values, and the norms that characterize the teachers' work and even knows personally more than a few of the staff members, the researcher's attitude in the research study was especially challenging, since she felt a need to constantly separate between her professionalism as a school teacher and her role as an instructor in the community. Since the researcher works as a teacher in one of the schools in the city, the research participants perceived her as an insider, as one of them; conversely, her aim was to research the culture of the community from the outside, as an outsider, with the proper respect for the figures operating in the research field.

The researcher understood that she must put aside as much as possible her professional knowledge, perceptions, and beliefs, so as to attempt to learn about the phenomena as an outside observer. Although the concepts and practices that the participants mentioned are known to her, it was important to her not to accept their statements as obvious ("the illusion of the familiar"), and therefore she sought examples, clarifications, and explanations. There were cases in which the researcher repeated what she heard so as to confirm the respondents' words.

To cope with her dual role, as a researcher and as a member of the community, the researcher adopted sensitivity. She interviewed the participants at their level, and not as an instructor versus the person being instructed. In the interviews, she asked many questions, listened carefully to the participants' responses, and sometimes wrote down for herself

important points that they raised. During the interviews, the researcher displayed considerable empathy. She nodded her head when the participants spoke, since she felt that this response encourages them to have an open and honest conversation. The atmosphere during the interviews was inclusive, and the conversation was very pleasant. Throughout the entire interview, the researcher “took care” of the respondents by avoiding asking questions or making indications that might hurt them emotionally or present them in a non-positive light. The researcher avoided statements with a critical or judgmental tone and avoided mentioning or comparing ideas and concepts stated by other respondents so as not to create a feeling of competition or to convey criticism. There were cases in which the researcher was forced to deal with ambiguity, for instance, cases of questions that the participants did not feel comfortable answering, and she legitimized their answers. As a researcher, it was very important to her that the respondents remain authentic and loyal to their thoughts, that they not be deterred by her presence, and that they not want to satisfy her or fear to cause her discomfort and disappointment.

The researcher emphasized before the respondents that she is not supervising or criticizing them and that she is a true partner in the processes of teaching and learning that occur in the community. However, there was a very low number of interviews in which the researcher felt that the relations of reciprocity and partnership between her and the participants made it difficult for her. There were situations in which the researcher stopped, thought, and suspended her response, so as not to create a feeling of threat in the respondent and to avoid sharing with her certain cases or experiences.

During the interviews, considerable knowledge was collected that inspired in the researcher a feeling of “the illusion of the familiar” and frustration that she does not have enough time to go in-depth in the responses. Therefore, at the end of every interview and after leaving the research participant, the researcher read the interview a number of times consecutively. As she went into further depth in the interviews, the researcher understood that the participants’ outlooks are different from hers, based on their personal experiences and reflecting the cultural and educational reality in the community from their perspective.

In the stage of the transcription of the interviews, the researcher was impressed by the considerable degree of authenticity on the part of the respondents and by the fact that the need to impress was not their central need. This feeling was supported by the atmosphere created in the sessions, by the participants' expressions, and by the contents that arose in the interviews. The recording of the interviews contributed to the establishment of relations of trust with the participants, since it enabled the researcher to listen to them in a "sterile" manner, to write comments, and to minimize the atmosphere of an "investigation".

7.1.2 Attitude of the Research Participant

In the interviews, the participants thanked the researcher for the opportunity to participate in her research study and reported that they felt that the researcher is strengthening them and giving them a place of honor. They talked with complete openness about themselves and about the professional processes they experienced during their participation in the community. At the start of the interview, the researcher clarified to the participants that the duration of the interview is about two hours. Most of the participants responded with amazement and shared that they believe the interview duration is too long, but in the continuation they realized that they have considerable information to share and to convey. There were cases in which the interview lasted more than two hours. The conversation in the interviews was clear, the participants spoke confidently and fluently, and they accompanied their statements with a large number of concrete examples.

7.1.3 Interaction between Researcher and Research Participant

The interviews opened with small talk and background questions. The participants shared with the researcher information, insights, and feelings, and between them and the researcher an atmosphere was created that enabled learning from, listening to, and respecting one another. The researcher felt that beyond the collegial relations, an intimate and safe space of trusting and close relations was created between her and the respondents. Since this is not an external researcher but somebody who is a part of the researched environment, a shared professional language was created. This increased among the

respondents the awareness regarding their role and the complex context in which they work, and therefore their responses were in detail and in depth.

In the interaction between the researcher and the participants during the interviews, it is possible to identify a number of patterns:

- From distance to closeness. In most cases, after the first question, which was open and general, was asked, “What is professional development for you?”, the participants’ answers were characterized by general statements, stops, and questions of clarification. As the interview continued and questions that were more focused on the personal and professional processes that the teacher experienced were asked, there began to be closeness, the interview assumed greater clarity and depth, and the participants’ personal exposure increased. The participants shared experiences, successes, and non-successes, emotions, and feelings. The researcher realized that the system of relations created between her and the participants created solidarity, trust, sympathy, and empathy and reduced the feelings of ambiguity, threat, and fear.
- Gaining insights during the interview. The interviews provided the participants with an opportunity to express emotions, thoughts, and deliberations and to produce from them insights on the personal and professional level that they had not been aware of before the interview. The teachers with honesty brought up issues and difficulties from the “field” that they experienced during their participation in the community and did not feel threatened by the very authority of the researcher, who, as instructor and as role-holder, links between them and the management. At the end of every interview, the researcher asked the interviewee whether she has additional points that she would like to add, which contributed to the establishment of the relations of trust between them. Some participants did not add anything, and others used this question to summarize their statements and emphasize points that appear to them to be especially important. The participants noted that the strength of the interview is that it has value for them and for the researcher and contributes to their professional development. The respondents described at-length the in-depth

processes, significant events, interactions, and experiences they underwent in the community.

- Empowerment of the interviewees. The questions in the interview enabled in many cases the empowerment of the interviewees and the strengthening of the personal and professional image, with the expression of emotions that are not frequent in common conversation. Through the reflection on the processes they experienced, the participants became aware of their abilities and discovered the strengths in their conduct. At the end of the interview, the researcher asked the participants how they feel, and they noted that the interview helped them focus for themselves the processes they experienced in the community. Moreover, they described a feeling of personal empowerment and satisfaction from the very fact that they are participants in the research. Some shared that the interview enabled them to be close to the researcher, the instructor of the community.

A look at these patterns enabled the researcher to have a comprehensive viewpoint on the learning community and on the individuals who are members in it. Her activity and experience in the field contributed greatly to the feeling of belonging and closeness to the participants. However, throughout all the interviews she was required to be meticulous in the differentiation between her voice and their voices. In this way, in her a cohesive picture was formed about the professional and personal development of the members in the professional learning community.

7.2 Characteristics of the Research and Examination of Its Aims

This research study included twenty leading teachers and coordinators of mathematics who were chosen by the school principals. The teachers and coordinators participated in the professional learning community that operated throughout the course of one school year. This part of the discussion will address the examination of the research objectives and the questions at its center. Which processes of teaching and learning in the professional community improve teaching practices? What are the characteristics of peer learning in the cultivation of a pedagogical discourse following the lesson study? How do

the characteristics of peer learning influence the professional and personal development of the teachers in the professional learning community?

The analysis of the research findings in this chapter is intended to present a theoretical framework based on a culture of learning and professional development of teachers in the education system in the framework of a learning organization. Successful education systems are based on a culture of daily professional collaborations among teachers, pedagogies that encourage the involvement of teachers and students, mutual trust, and routine and quality feedback intended to bring about improvement. A culture of collaborative professionalism is characterized by the inseparable combination between autonomy and personal and group responsibility. It focuses on the constant improvement of the professional practice and on innovation, but not on changing fashions and on the commitment to pedagogical processes (Fullan & Hargreaves, 2016).

The professional learning community in this research study created a model of pedagogical innovation in three aspects: personal, professional (in the field of mathematics), and social.

In the research it was found that the personal aspect is composed of emotional and instrumental experiences, which give the teacher in the learning community opportunities to build knowledge, acquire skills, and build applied professional instruments incorporating self-awareness as a part of her professional development. It is possible to identify processes that the teachers experienced in the peer learning, such as, for example, the building of a personal and value-based perception about the feeling of worth, self-efficacy, and renewal. This perception led to a feeling of empowerment, high motivation, and improved self-motivation of the teachers, which were expressed in the pedagogical discourse. These experiences advanced a process of meaningful theoretical learning accompanied by innovative activity in the community.

From the perspective of the teachers, it is possible to identify that the participation in the professional learning community empowered them personally, raised their self-image, and gave them confidence. This finding supports the basic assumption that for most

of the professional organizations learning throughout the work life is perceived as a means for the strengthening of the self-confidence, personal development, and career development (Noe, Clarke, & Klein, 2014). The findings of the present research study reinforce the assumption that observing teachers in mathematics lessons held by their peers contributes to the professional confidence and sense of satisfaction of the observed teacher (Lewis et al., 2009; Wasilk & Hindman, 2011). Routines of peer learning in the community, in which the teachers observe one another and analyze their lessons, caused the teachers to feel confidence, respect, empathy, and satisfaction with the way of teaching of the teacher whom they observed. In the observation of their peers, the teachers are exposed to diverse ways of teaching, and they feel that this type of learning is very effective for them and gives them a good feeling, satisfaction, enjoyment, and motivation.

The feeling of satisfaction increased the teachers' desire to belong to the community and to hold in it meaningful relationships. A research found that as the teachers felt belonging to the community, the processes that they experienced were meaningful for them and required of them acceptance, trust, and a degree of intimacy. The belonging and sharing in the personal and professional experiences created an atmosphere of commitment to change of the traditional pedagogical perception. The teachers exhibited great dedication and caring, felt of value, and felt responsibility for the achievements of their students. Gradually in the community a culture of collective responsibility developed for all the students. This characteristic is commensurate with the argument that appears in the research literature, according to which a community that displays personal and group responsibility influences the rise in the students' achievements (Allen, 2016; Hargreaves, 2013).

Many researchers (Dufour et al., 2006, in Blanga, Landler-Pardo & Shachar, 2011; Ben Peretz, 2014 in Michaeli & Somer, 2014) have indicated that the feeling of belonging in the learning community is one of the factors of the self-efficacy of teachers and the success of the community. The present research also indicated that teachers in the community acquired knowledge and new skills and identified in themselves the powers that strengthened their sense of self-efficacy regarding their ways of teaching. The

community offered for them many opportunities to examine the process of their learning, to learn from mistakes, to develop unique pedagogical discourse, and to analyze strategies and products of learning. Teachers initiated changes on the background of support and ongoing and consistent reference of all the community members and bore the joint responsibility for the planning and performance of the lesson. They displayed joint responsibility for the learning, a datum that validates the argument of previous research studies (Hunter & Back, 2011; Toshiya & Toshiyuki, 2013), according to which the feeling of responsibility and belonging to the community is one of the factors for the flourishing and success of a community.

It is possible to identify in this research study innovation in the personal-emotional aspect. The teachers shared the worries, doubts, concerns, musings, and fears that they experienced as participants in a professional learning community and reflected in this the fear to be exposed as non-professional in teaching. This finding was not found in the review of the literature, and therefore it is an innovation and reinforcement for the development that occurred among the teachers in the community. They saw themselves as a part of an intimate group, which enables openness, listening, and empathy, and developed the ability to speak about concerns and fears in an honest, open, and advancing manner, without judging one another. It is apparent that the teachers in the community derived from the participative discourse personal and meaningful learning.

In the personal aspect, it is possible to identify that in the community of learners the teachers were found in a constant process of learning and were partners in reflection – not only for the purpose of the examination of their work in the class but also for the need of observation of the very process of their professional development. They had the ability to examine whether what was done in the community influences their teaching in actuality and thus to improve their theory of action (Lieberman & Miller, 2016). Bokek-Cohen (2016) noted that the reflection is one of the important instruments in the professional development, and the innovation in this research study is the teachers' argument that because of the reflection they succeeded in identifying difficulties and challenges in the ways of teaching in real time. This discovery enabled the instructor to engage in challenges

that arose following lesson study, to expose the teachers in a professional community to new copings, and to develop new ways for the understanding of the reality and dealing with it.

The research further indicates that the teachers acquired skills of methodical and processual observation of their personal learning and collective learning as a community. This perspective explains their ways of thinking in planning versus execution. A direct connection was found between characteristics of instrumental experience – self-reflection, feedback (giving and taking), re-examination of the teaching, multiplicity of viewpoints and implementation of instruments of reflection in teaching – and the process of learning in the community that supports in the perception of the teaching as a practical-reflective profession during the professional life. This understanding is supported in the argument of the researchers (Avador, Rheingold, Kfir, Swanick et al., 2014; Avalos, 2011) that the positioning of the teaching as a ‘profession’ necessitates the cultivation of reflective thinking practices of teachers about their activity and planning of future processes. The literature found that the reflection is an important instrument through which the teacher implements thinking about the improvement of her teaching method and her students’ way of learning. This is an instrument that serves the teacher for the constant improvement in her teaching (Earley & Porttitt, 2010; Thoonen et al., 2012).

The present research study indicates additional aspects on the topic and emphasizes that the reflection operated in a number of dimensions: it accompanied the teachers’ process of learning and enabled the conceptualization of their perceptions while making them public and examining together their advantages and disadvantages. Beyond being a basis for productive and instructional discourse, the reflection enabled the documentation of processes that occurred in the community for the purpose of the drawing of conclusions that address the improvement of the teachers’ ways of teaching-learning. It was found that the reflection is a two-way process that caused teachers to look back and to address the experiences they experienced in the community. It helped teachers think about their practice in new ways, and it was clear that for them it was a powerful and significant development tool (Weder-Weiss & Lepstein, 2015).

The innovation in this research study is that the process of reflection created in every teacher awareness of the decisions and actions entailed by her teaching practices, since it was based on evidence from the lesson study and became routine in the community. The reflection and sharing in insights and knowledge provided the teachers with an in-depth understanding of processes and decisions both in the stage of the planning and in the stage of the execution in the class, an understanding that has considerable pedagogical and educational value.

More than a few researchers addressed reflection as an instrument for the improvement of the teaching and the identification of the behaviors that contribute to the establishment of the learning in new situations (Azulay, 2016; Karsenti & Charlin, 2014; Sjoer & Meirink, 2016). However, this work found prominently that it enabled the teachers to develop new insights in the personal, professional, and interpersonal dimensions (the development of the learning community) and created among them mutual responsibility for the learning processes. The reflection offers the teacher to look at the process of learning and to know herself as a person and a better learner, and therefore it was found to be a strategic instrument for the leading of the process of change. The conclusion is that the reflection that the teachers hold during the learning process in the community is the very heart of the process of the building of personal knowledge and it is critical to the development of every teacher in the community.

Additional aspects that were prominent in the research findings were authenticity and relevance in the teaching process, which were expressed in concrete discourse about practical issues during the lesson study, in the practice of the problem. During the teaching and peer learning, the teachers sought for ways of coping with issues that arose and acted so as to effect a change through the transition from patterns of teaching of the “transfer of knowledge” to patterns of teaching that have interest, relevance, and pedagogical and didactic meaning. Previous research studies found that when teachers can link their learning to something relevant in their world, for instance, through the examination of cases in the “field”, they learn better (Cordingley, 2010; Lieberman & Miller, 2016; Parr & Timberley, 2010).

In this research study, the teachers described the routine of peer learning in the community as an authentic experience, fascinating and beneficial more than any traditional professional in-service training course they attended in the past. The reason was that the learning in the community was adjusted to the teachers' characteristics, environment, and needs in a renewing world, with reliance on their existing knowledge, curriculum, and world of concepts. The teachers saw in this instrumental experience an opportunity for pedagogical innovation that addresses ideas and processes of value for them.

The present research study teaches that the teachers in the learning community are given an opportunity to deal with solving pedagogical problems and issues, acquiring instruments for coping with and implementing professional challenges, through the use of methods of teaching adjusted to the 21st century. It was found that the teachers in the community acquired diverse ways of teaching, used concepts from researches and theories, were partners in lesson study, discussed theoretical principles of teaching, and detailed them into operative actions that can be implemented in the classroom and that can have their performance examined. This issue reinforces the conversation on the teaching practices as meeting the test of reality and bridging between theory and practice. It is apparent that the teachers "lead" their ideas into the classes and examine them methodically and judiciously from their commitment to their students' success (Bar-Yakoov & Tubin, 2014; Gonchar-Newman, Rolfhus, Keys, Taylor, & Gersten, 2014; Leahy & William, 2012).

Similar to previous research studies that addressed the connection between the theory and mathematical ideas and the implementation of practical and theoretical knowledge in the mathematics lesson as a way of the professional development of the teacher (Hargreaves, 2013; Knight, 2011), this research study also indicates that the teachers implemented best teaching practices and mathematical contents with the aim of improving in professional and pedagogical terms. They evinced expertise in the content field, advanced the learners' achievements, and created meaningful learning, but unlike previous research studies that addressed the instrumental experience in the implementation of teaching practices in only the professional aspect, this research study also addressed the

personal aspect. It was found that the teachers in the community were exposed to a wide range of teaching methods, learned to examine and analyze instructional techniques, and exercised judgment in the choice of ways of teaching for their class. This learning increased their self-confidence in the implementation of ways of teaching they were afraid to teach (even if they were known) or in the implementation of new ways. It was further apparent that the desire for new ideas and methods of teaching greatly increased the teachers' motivation to assimilate a wider range of teaching methods.

The research literature discusses the need for diverse frameworks of professional development and for teachers with creative and flexible thinking, who can adjust themselves to the changes that are brought by the 21st century. This flexibility is expressed in adjustment to ambiguous and changing situations, as well as the ability to cope independently, to share knowledge, and to develop instructional practices in processes in which there is cognitive flexibility and creative thinking (Farnsworth, Kleanthous, & Wenger-Trayner, 2016). This research study included a broad range of examples of cognitive flexibility; the teachers in the community adapted the teaching situations to changes they encountered in the everyday life in the class, made their thinking flexible during teaching in the class, and broadened it to new channels of the integration of high order thinking. They learned to look at teaching events from different angles and to deal with new ways of teaching and to implement them in the classroom. This process led the teachers to free themselves from fixed thinking and to shift from thinking about “problems” to thinking about “possibilities”. This flexibility allowed them to act independently and to make decisions in pedagogical and organizational issues. The discussions following the observation of the peer lessons enabled the teachers to depart from the personal thinking patterns, to identify additional possibilities, and to discover further creative ways for teaching. This experience led the teachers to meaningful and creative learning during their participation in the community.

Professional development in the professional aspect of instrumental experiences is an ongoing process in which the teacher acquires a repertoire of teaching techniques and strategies, which help her to know when and how to adopt one or another method. In this

process, the teachers were active, and their experiences were on the level of teacher activity. The process they experienced was effective, caused an improvement of their teaching-learning processes, and facilitated in the coping with the entailed challenges.

The teachers' development in the personal aspect was not complete without the professional aspect, which made every teacher in the community meaningful. The professional development of the teacher in the education system forms her professional identity and enables her to realize her personal abilities. It even provides a response to active and meaningful learning throughout the professional career and contributes to independence, critical thinking, and creativity. In the education systems in the world the need has arisen for the integration of theoretical knowledge on teaching with cumulative practical experience for the professional development of teachers (Paz & Salant, 2012), and thus the way was paved for the establishment of communities of teachers, the goal of which is creation of pedagogical knowledge and teaching practices (Farnsworth, Kleantous, & Wenger-Trayner, 2016).

In the research discussed here, the professional learning community acted around the field of knowledge of mathematics and around the shared pedagogical focus that arose following the shared lesson study – this through emphasis on the sharing of the teachers' professional experience, joint thinking, research and development of ways of teaching in joint discussions, reflective analysis, and peer learning (Verhoef et al., 2015). The professional development is divided into two fields: first, the theoretical knowledge of the teaching of mathematics in the elementary school and second, the practical knowledge of techniques, skills, and actions used by the teachers (Bautista & Ortega-Ruiz, 2015). The community in this research study engaged in content knowledge in the field of the teaching of mathematics throughout all the encounters, which included mathematical contents, theories, and current researches. The research findings indicated that the teachers assimilated and implemented the content knowledge they acquired in the community. In the aspect of the lesson study, it was found that the teachers acquired the ability of independent learning during the analysis that was held after every observation of a lesson. Due to the observation of ways of teaching of their colleagues and themselves, they

developed routines of the research of teaching practices. This finding explains the innovation in the professional development of teachers in the learning community: the teachers not only acquired instruments for the analysis of teaching strategies but also assimilated these routines as an inseparable part of their work in the community and their teaching in the class. This perspective is different from previous research studies, in which the teachers' focus was only on the giving of mathematical content and not on the research of the lesson in all its components. This finding constitutes an innovation in the perception of the teachers in the community and sheds light on their role as building mathematical knowledge for their students. The teachers in the community researched here developed professional skills, such as criticism and reflectiveness regarding the teaching practices, acquired tools for the lesson study, and learned to ask relevant questions, thought about new practices, internalized new ideas, and assimilated new ways of thinking.

The activity in the community required the teachers to think about the ways of teaching they know, to bridge between theories and practices, to examine methodically their approaches and to re-evaluate them – all so as to promote their students' achievements (Gonchar-Newman, Rolfhus, Keys, Taylor, & Gerstein, 2014).

To differentiate from research studies that discussed the lesson study in the purely professional aspect (Corcoran, 2011a; Jacobs, Lamb, & Philipp, 2010), this research study makes it clear that the research process was significant for the teachers in the community also in the personal facet. Both younger and older teachers identified their ability to frequently examine the teaching and to receive constructive feedback from their colleagues. This finding emphasizes the in-depth observation of the teachers of the personal-reflective processes meaningful to the process of their professional development. It was further found that the processes of lesson study in the community increased the trust that reigned between the participants and created a safe personal space for sharing and conveying criticism.

The findings of the present research study indicate another aspect that promotes the students' achievements: the extension of the field of the teaching of mathematics

commensurate with the skills of the 21st century, including the introduction of technological methods that can be integrated in the teaching work and the development of the teachers' expertise in the disciplinary knowledge field (Gorin, 2010; Heishrik & Kfir, 2012). This research study emphasizes the abilities of teachers in the professional learning community to adjust themselves to the needs of the era, and it is apparent that in parallel to the process of peer learning in the community the teachers instilled in the students new knowledge with the combination of diverse ways of teaching: integration of diverse teaching methods, integration of computerized instruments, group learning, use of activities that invite high order thinking, coping with complex questions, and ability to solve problems with diverse strategies. This finding reinforces the argument according to which the teacher of today is supposed to "lose" from her centrality in the teaching processes. Indeed, the role of the teacher was interpreted in the community as having characteristics of pedagogical innovation in teaching (Blau & Eshet, 2014).

An interesting innovation was found in this research study in the aspect of the teachers' pedagogical discourse. These discussions enriched their and their students' toolkit with the skills required for life in the 21st century and led to the focus on the issue of innovation and the encouragement of the creative use of knowledge. The teachers' understanding that learning is an active and dynamic process that creates new knowledge is expressed in the products they presented. This process led to another conclusion: the student must be at the center of the learning and not the content knowledge, and hence it is necessary to allow him to develop as an independent learner who builds knowledge. The understanding is created that the teachers must lead the students to a reality of learning at all times and in all places, which will link between mathematics and the everyday life in a dynamic and changing world.

Another aspect that is expressed in this research study is the assimilation and implementation of the main ideas to which the teachers in the community were exposed. The teachers were exposed to broad content knowledge that included not only a collection of procedures and calculations but also elements of thinking, creativity, and conceptual understanding. They experienced meaningful learning through cross-fertilization, and the

innovation in the process was that they experienced in actuality each and every stage and not only analyzed the lessons that they observed. This learning enabled them to share reflective knowledge following their teaching in the classroom. This finding strengthens the argument that learning from the “field” is a critical and essential means for the development and implementation of innovative models. Review of the findings that pertain to the assimilation and implementation of the knowledge indicates that the teachers in the community displayed openness to new ideas and knew to integrate them in their teaching methods. This finding supports previous researches that maintained that it is possible to change and assimilate teaching practices only if the community members examine them systemically and implement them through constant learning. In other words, teachers in a community must be a part of a group of colleagues who share the new insights they acquired during the sessions (Korthagen, 2010).

The research indicates that, in addition to the content knowledge that the teachers acquired in the professional learning community, they experienced and assimilated teaching skills and innovative approaches to the teaching of mathematics as a part of the development of their pedagogical knowledge. In the community there frequently was a space for shared and continuous discourse between the teachers, which constituted a main axis for the sharing of the pedagogical knowledge that included personal and professional support. This discourse included components of the building of criteria for the analysis of the lesson, lesson study, and proposal of alternatives for teaching skills. The process helped the teachers to identify the strengths of the lessons they analyzed and to examine the processes of teaching and learning in their classes, through the implementation in actuality of the pedagogical knowledge they acquired in the community.

This situation is different from previous research studies that addressed the pedagogical discourse as a discourse that is fundamentally a theoretical discussion of the ways of learning and teaching and of instructional dilemmas (Birenbaum, 2009; Hargreaves, 2013). In this research study, the reference to the pedagogical conversation was broader, and in its framework time was dedicated to the processing and analysis of the lessons. The teachers built guidelines for the best mathematics lesson and implemented

them in their classes. After the experience, the teachers in the community sought the advice of their colleagues and shared the insights that arose following the lesson. The pedagogical discourse created a continuum between the learning in the community and the work in the class and put to the practical test the relationship between the teaching actions and the processes of learning that occurred in the community. This process led the teachers to re-examine the pedagogical knowledge and enabled them to go in-depth into mathematical topics while studying them from different aspects. Another point that should be noted is the examination of the evidence from the classroom and translation of the insights that arise from it into teaching actions. The present research study saw the ability to understand and to refine the professional dilemmas in the planning and analysis of the lesson to be a challenge that constitutes a part of the process of the building of alternatives for the teaching.

The research findings indicate that the pedagogical discourse in the professional learning community created opportunities for the development of the pedagogical thinking and enriched the teacher's ways of teaching. In this process, a shared professional culture is built and an educational language formed, when on its basis the joint practice grew. In other words, it is no longer a situation in which every teacher acted alone according to her educational outlook but the formation of shared principles that enable reciprocal observation of the practice of all the partners so as to evaluate and improve it. This change led to the creation of a familiar and agreed upon conceptual basis among the peers in the community.

Another characteristic of the pedagogical knowledge that is expressed in the research is the handling of the students' typical mistakes in mathematics lessons. The students' mistakes are perceived as something that should be avoided as much as possible (Bar-Yakoov & Tubin, 2014); however in this community emphasis was placed on the analysis of the mistakes as a source of learning from the understanding that these mistakes are not incidental or isolated. The source of the mistake is the more comprehensive and in-depth perception of the student that should be identified. In the framework of peer learning in the community, the teachers shared their students' products of learning and analyzed

strategies for solving problems. This process opened for the teachers a gate to the shared understanding about common mistakes and teaching strategies during professional dialogue.

It is possible to identify research studies that support the assumption that peer learning in the professional communities that address important issues such as the students' common mistakes in mathematics increases the depth of the teachers' content and pedagogical knowledge. This process leads to a consistent rise in the students' achievements in the elementary schools (Mindich & Lieberman, 2012; Nguyen, Fernandez, Karsenti, & Charlin, 2014).

In the aspect of the analysis of the students' mistakes, the innovation in this research study was expressed in the understanding that it is necessary to learn from every common mistake of the students and to find practices that will provide an answer to this. This issue is an important stage in the professional development of the teachers, who stop seeing the class as an entirety and begin to see the students as individuals and to recognize their perceptions and personal way. The handling of the students' typical mistakes gives the teachers important tools for their work, broadens their knowledge in mathematics, and increases their intellectual curiosity.

The findings of this research study in all that pertains to the processes of teaching in heterogeneous classes that necessitate use of diverse ways of teaching showed that there is a connection between the use of diverse ways of teaching and differential teaching. The instructor helped the teachers identify their practices during the process of teaching and in parallel they were exposed in the community to new ways of teaching – a process that led them to examine the relationship between their ways of teaching and their students' learning. In addition, the teachers formed unique ways of teaching in order to allow every student to be an active partner in the learning experience and to awaken enjoyment and motivation. In this way of teaching, a best lesson is created, in which the teacher exercises discretion in the choice of ways of teaching as an answer to difference in the classroom.

Research studies indicate that the teachers who participate in lesson study undergo a professional process in which they share pedagogical insights that lead to differential instruction (Gess-Newsome, 2015; Verhoef et al., 2015). In this research study, the teachers focus on the teaching components that they wanted to change for the purpose of differential teaching in their class and for this purpose they acquired a toolkit rich in teaching strategies; it is possible to say that they became experts in the teaching of mathematics and the adjustment of ways of teaching to the students' different needs. The discussions in the community about the ways of teaching enabled them to be reflective and critical regarding the choice of the methods of their teaching. The pedagogical knowledge they acquired in the community helped them change the traditional work patterns of frontal learning in most of the lessons to learning that integrates different ways of teaching as a response to difference in the class.

The research shows that improvement of the practice and the advancement of the pedagogical knowledge of the teachers in the community were entwined, and this was expressed in the development of their teaching skills. The teachers' internal-intuitive knowledge became open knowledge when they shared it in the peer learning and in the continuation they implemented it in their teaching in the class. It is important to note that concurrent to the process that the teachers underwent in the community they developed professionally from session to session. The community offered the teachers a space for practice and meaningful learning, active involvement, and experience in a range of pedagogical and content aspects. They themselves "grew" the practical teaching knowledge and provided an answer to the challenges of the profession, and the community provided an ideological, organizational, and professional framework, in which they acted and uniquely shaped their way of teaching. This is a profound perceptual change, at the center of which is the shift of part of the responsibility for professional development to the teachers.

In addition to the professional aspects that addressed the professional development of the teachers in the professional learning community, in the researched community a setting was created of social aspects, as well as a "climate" of relations of trust, a supportive

environment, and attention alongside norms of collaboration, teamwork, and peer learning. The research literature that addresses the professional learning communities sees the teachers' work environment to be a factor that influences the social nature of the learning, which is influenced by the system of relations between the community members and by all levels of development in it – personal, emotional, social, and professional. The community addresses the emotional and social aspects of the teachers' experiences and the advancement of the learning that enables the transfer of knowledge (Mitchell, 2013).

This research study found that the community engaged not only in the professional aspects of the content domain and that the shared learning in the social-cultural facet was central. Among the teachers in the community, meaningful social relationships were created that contributed to the feeling of personal satisfaction. The strong relationship between the learning and social practices derived from the fact that among the community members relations of trust, confidence, and cooperation developed, and consequently a supportive environment that encourages openness was created. The social climate in the community established a system of interpersonal support that combined between the pedagogical activity and the emotional support. The teachers created for themselves a social network outside of the community sessions, in which they were attentive to their peers' voices, desires, and needs and shared emotions following successes and difficulties. The research findings indicate that the teachers emphasized the intimacy and closeness that were created in the community and the safe space for learning and professional development that it offered to them.

The research literature indicates that the learning communities offer their members support in their coping with challenges and changes in their near work environment and make their learning “lifelong learning” in practice (Kaney, 2006). Indeed, the findings of the present research study indicate that the learning in the community created a space for personal development and offered meaningful opportunities for belief in personal efficacy and in professional and social ability. The learning environment in this research study constituted a fertile ground for the examination of the instructional practices, through the realization of the opportunities innate in the personal qualities of each teacher in the

community. The open and nonjudgmental atmosphere encouraged the teachers to learn and to renew themselves and created a culture of improvement.

The learning environment in the community included another component: a feeling of trust. This feeling was expressed in respect towards the teachers' difference and acceptance of the other in the group, in the sharing among the teachers in the preparation and planning for the lesson, and in insights and drawing lessons from it. The building of reciprocal trust was undertaken through personal attention, openness, and exposure in the process of teaching, honesty, and personal example. The teachers in the community felt that they learn new things about themselves due to the trust and openness of the group members. This finding expresses close and respectful work relations based on trust among the members of the community, which encourages the teachers to "open" the door of their class and make their teaching public.

The research study indicates that the supportive environment in the community created tools for the development of skills of listening, which require the peers to be empathetic and to be free of condescension, extravagance, and egocentricity. The teachers in the community experience true and honest attention, listened to one another, exchanged between themselves ideas out of respect, and challenged and helped one another. This process did not happen naturally. In the first sessions, the teachers did not listen to one another and they interrupted one another's statements, and due to the instructor's intervention and direction, the picture changed. Gradually the teachers learned to listen to one another, first through an instrument for the outline of a pedagogical conversation with the instructor's artificial and rigid leadership, and in the continuation through its gradual and natural assimilation into the conversation between them. A new understanding that arose from this research study in the aspect of attention is that when the teachers listened to their peers attentively, they succeeded in accepting with openness new ideas and insights from their colleagues, and even in changing their attitudes in light of the joint conversation.

It should be noted that the relations and climate created in the community enabled the teachers to enjoy the support of the "group of equals" and to form new insights. The

emotional support created in the community constituted a fertile platform for consultation and reciprocal assistance. This framework made the group of teachers into a “true” group that maintains reciprocal relations of counseling, support, friendships, and even enjoyment.

As aforementioned, the present research study studied the norms created in a professional learning community, and the prominent finding identified in the interviews with the community members was cooperation. Alongside the supportive climate, in the community social routines, a vision, and shared values were created. The learning atmosphere created norms of cooperation, teamwork, and peer learning, which were a part of the process of the formation of the community and helped the members in the carrying out of tasks. In essence, a culture of professionalism was created that served all the community members in the peer learning.

This conclusion is commensurate with the argument that appears in the research literature, according to which professional development invites collaboration and training as milestones for the conquest of collective challenges, the goal of which is growth, improvement, and learning throughout the career in every educational institution (Hien, 2008).

The collaborative work in the researched community incentivized the group members to bear shared responsibility following the pedagogical discourse and to search together for creative solutions for issues that arose during it. The teachers in the community noted that they felt safe and protected to bring deliberations and professional mistakes to be discussed, which created among them cohesion and contributed to the feeling of personal wellbeing and professional satisfaction. The research literature presents that the teachers’ professional development needs to be collaborative and to entail the sharing of knowledge and must focus on communities of teachers who work together and not necessarily on individual teachers. Such learning invites cooperation among the learners and positively influences the qualities of the learning in three dimensions: personal, social, and professional (Kennedy, 2011). Indeed, this research study shows that the collaborative

work in the community provided for its members tools for coping with interpersonal conflicts and for better interpersonal and social communication.

Another argument that appears in the research literature is that a culture of collaborative professionalism flourishes on the background of difference and differences of opinion, encourages a range of styles, strengths, and approaches, and develops the ability and personal and group judgment (Fullan & Hargreaves, 2016). In this community, the teachers did not rely on cooperation for the purpose of the formation of ways of teaching and learning, objectives, strategies, and instructional dilemmas but shared with one another what is traditionally considered to be “private”: personal emotions, feelings, concerns, and personal and other experiences. The collaboration is expressed in routines of regular discourse circles characterized by a supportive, participative, and inclusive atmosphere, and consequently among the teachers reciprocal relations developed that enabled emotional availability and a space appropriate for the reinforcement of their personal place. This perspective is different from that appearing in the research literature and sees pedagogical and content knowledge to be the “main actor” in the equipping of the teachers with dialogic instruments of research and observation of the self so that they can shift from static learning to active action that entails the change or adoption of new professional patterns (Jacobs & Yendol-Hoppey, 2010).

Another point deserving of mention is the range of teachers in the community who come from different schools and have different perceptions. The learning in one space led to an invaluable process: the commitment of the ‘learners’ and the ‘teachers’ together to ideas, processes, and activities. The characteristic is commensurate with the research literature that indicates that cooperation in a professional learning community is not only a means in the educational activity but also a goal in its own right (Sebastian & Allensworth, 2012).

The research findings illustrated that involvement in the community fertilized the pedagogical discourse between the colleagues and connected between the wisdom of theory and the wisdom of practice. The instructor of the community enabled the cultivation

of a shared “wisdom of teaching” and this sharing created a space that was like a greenhouse for creative and groundbreaking ideas. The cooperation in this research study derived from the very fact of the meaningful learning that occurred following the shared discourse with other teachers, but also from the existence of regular arrangements and stability of teamwork. The research literature sees teamwork that is well-organized and offers the conditions required for involvement in the learning processes to be a basis for the creation of arrangements and stability that enable security and meaningful learning (Hargreaves, 2013; Lom & Sullenger, 2011; Schechter, 2010).

In this research study the teamwork in the community became a norm and was characterized by cooperation, focus of the group’s strengths, and a high degree of mutual dependence in favor of lesson study in the process and implementation of teaching practices. At the start the community, sessions were held individually and with a sense of loneliness, and as the interpersonal relations among the community members became established, the teamwork in the pedagogical and social facets formed. The teachers moved from an individualist perception of the “self” to a collaborative perception of “us” that sees the teaching profession to be a part of a system of relationships in which they learn and teach, influence and are influenced. In the researched community it is possible to indicate teamwork that steadily strengthened on the basis of values of basic trust, collaboration, mutual coordination, support, and agreed-upon norms.

The contribution of teamwork to the pedagogical facet was also identified, in that the teachers identified diverse ways of teaching using criteria they built together. They analyzed mathematical dilemmas using the sharing of personal knowledge and reached shared insights and solved problems that were observed in the lesson study. The community helped the teachers to cope with the challenges of the teaching and to make them into new opportunities for learning. The uniqueness in this research study is that the learning in the staff is perceived as effective and deriving from the professional activity and dynamics in the community. The teachers shared that the teamwork promoted them in that it created integration of the knowledge and instruments at their disposal. In the social aspect, the members of this heterogeneous community created learning encounters based

on trust, cooperation, and work relations, and this is expressed in the assimilation of values, commitment to one another, and acceptance of others. In the teamwork the teachers were a personal example for one another, evinced tolerance and mutual respect, and acted out of lack of judgment. The community created a new and unique infrastructure for teamwork entailing social abilities.

The social abilities in the community were expressed also in the peer learning and in that the teachers succeeded in perceiving their fellows as having rich experiences. In the process of the understanding of the deliberations around concealed layers of pedagogical issues, challenges were created, and the teachers felt personal and social commitment to be partners in this unique group. The peer learning offered a process in which the teachers were partners not only for knowledge but also for providing personal, social, and emotional support. This partnership created in the community a work routine that became a unique norm in the community life. Norms were created of mutual understanding and providing a platform for each one and the insights that arose. The interpersonal communication changed the nature of the learning, which becomes supportive, comprehensive, and positive, a change that would not have existed if such norms had not been created in the community. This finding supports the assertion presented in the research study, according to which in the community in which there is peer learning the staff members contribute to and are contributed by the group, develop beneficial relationships, and are strengthened because of the interaction with the peers (Khaw et al., 2011; Leijten & Chan, 2012). Additional norms that were expressed in the peer learning in the research were the making of the teaching public and the fertile pedagogical discourse as an inseparable part of the activity. The teachers opened the door of their classroom as a part of the transparency of the process of teaching and as a part of the in-depth and experiential sharing among colleagues. It is possible to identify this idea in the research literature that describes the peer learning as an experience that enables challenging and empowering added value, regarding the participants' self-examination of themselves. This examination is undertaken regarding their image and the way in which they perceived by their fellow group members and act in teamwork. The colleagues learn from one another and analyze their work, thus

influencing the cognitive development, motivation, and trust between them (Hammond et al., 2010).

The norm of pedagogical discourse as a part of the work routine in the professional learning community required a space for shared work and reciprocal learning. The pedagogical discourse in the community offered a team culture based on norms of discourse that support cooperation, openness, and reciprocal learning. In the peer learning the teachers displayed shared responsibility for the learning and were very involved in the learning process. A feeling of belonging, confidence, and mutual trust was created, alongside involvement. The norms created in the learning process of the teachers in the professional community created routines for the conduct of the community members both in the professional facet and in the personal and social facets.

7.3 The Instructor in the Professional Learning Community

This research study describes the instructor of teachers in the community as accompanying processes of learning, personal processes, and team processes. These characteristics have support in the research literature that sees the instructor as responsible for the dynamics in the community and for the influence on the learning, for the identification of the strengths and the connection to them, for direction, for development and creation, and for the increase of the feeling of efficacy – all this with the aim of helping the personal and professional advancement of the colleagues (Allen, 2016). In the professional-pedagogical aspect, the instructor has considerable contribution in the success of the shared lesson and in the improvement of the quality of the teaching (Rock, 2016). The instructor gives support to teachers in the community in the planning of the lessons, the observation of the lessons, and the pedagogical discourse afterwards. The instructor has extensive knowledge in a variety of areas of content and teaching and pedagogical-didactic expertise and has interest in acting to cultivate the professional ability of the fellow teachers (Ponte, Quaresma, Baptista, & Mata-Pereira, 2014).

In this research study, it is possible to identify that the instructor of the community was a full partner in the peer learning. The teachers and the instructor contributed of their experience and expertise to the community, had joint responsibility for the entire community, and led it to the realization of objectives and defined goals. A unique interaction in this research study was expressed in the shared learning of experts from the field of the instruction of groups and has didactic knowledge in the teaching of mathematics and of teachers whose role is to teach in the class. These reciprocal relations strengthened and improved the mutual learning between the instructor and the teachers and created a quality pedagogical conversation that connects between the experience in the field and contemporary theory and research. Interaction of this type does not exist in traditional professional development such as an in-service training course.

The process of instruction in a community is based on the principle that the teachers should not be provided with contents or didactic ideas, but rather they should be given the tools, perceptions, and skills for implementation. In this way, the teachers in the community learn to develop innovative teaching skills, which help them develop and deal independently with new instructional issues. The instructor in the community supported the asking of questions as a resource for the creation of new knowledge and not necessarily the giving of answers. On the one hand, it enabled freedom of action, and on the other hand, it saw to the regulation of the personal and professional growth of every member of the community. Hence, the instructor in this research study has a unique role as one who provides teachers with “scaffolding” and support that lead them to independent learning, critical thinking, openness, and creativity in the processes of teaching alongside the production of lessons for quality and meaningful teaching.

The instructor in this research study was required to fill simultaneously two roles: the first role a partner in the group and the second role as mediator of the learning-teaching processes based on interaction and dialogue between the group members. The instructor enabled every member in the community to make her voice heard alongside the group voice and connected between theoretical knowledge and innovative performance abilities.

According to this perception, the instructor is required to gradually reduce her support and to convey steadily increasing responsibility to the teachers as they steadily developed.

7.4 Challenges in the Establishment of the Professional Learning Community

The teachers in this research study participated in the professional community in which there are pedagogical, personal, and social processes that include both cooperative and competitive relations. These processes entail the coping with challenges that characterize the education system in Israel in the 21st century, when the most complex is the transition from traditional education to education personally tailored to each teacher and to each student. This learning process in the professional community helps the teachers cope with the challenges of the changing and complex reality, and it is vital to the assurance of the relevance of the education system. The teacher has central importance as an individual who is a part of the collective system, and the meetings of the teachers in the community caused the teachers to redefine their role from individualist teachers to teachers who see themselves as belonging to a professional community. The challenge that every teacher in the community faced was to combine between the group cohesion and the place of the individual in it, as well as to integrate between the desire to lead and to be prominent as an individual teacher and the need to be a partner in the group. The teachers were forced to abandon their individualist orientation in favor of collegiality, teamwork, and cooperation.

Teachers who participated in the community noted that their work is characterized by individualist teaching, “behind the classroom door”, when they are disconnected from their peers. The exposure of the teachers to the lesson study process in the community caused them to understand that the personal and centralized way of teaching does not advance them and their students. In the framework of lesson study, the teachers were equipped with dialogic instruments that enabled them to go in-depth in the study of their teaching and to provide feedback for one another. The challenge of the community was to create teachers with mathematical knowledge who are partners in and committed to peer

learning, while they share their learning with others and create a culture of continuous learning. Peer learning in the community more than once has caused tensions and conflicts between the instructor and the teachers, such as in situations of lack of agreement to share the pedagogical and content knowledge of the teacher in favor of the creation of a culture of observation in lessons and giving of feedback. The observation of lessons invites many times the judgment of peer teachers, and most of the teachers did not succeed in being free from the criticism that is not constructive. Responses of this type increased the teachers' concern that they will be observed. The instructor's challenge was to make public the teaching, while referring to the sensitivities and the defensive position that the teachers adopt to preserve their public image.

The perception of the role of the teachers in the change has changed, and a transition is apparent from an intuitive engagement in the practical issues to a structured and in-depth pedagogical discourse that integrates meaningful learning that drives change in the ways of teaching and learning in the class. A routine of professional learning through pedagogical discourse was found to be a not simple task. The challenge in the community was to change the teachers' work patterns through a look at them in a long-term perspective. The teachers were required to understand that the pedagogical discourse must be authentic, must exist as a result of the daily teaching in the classroom, and must base on data and representations from their work.

In the research, it appears that when the discourse revolved around the teachers' difficulties and failures and even represented a collective problem, it tended to erode their public image. Many teachers found it difficult to cast doubt on their teaching and to include the uncertainty that accompanies the pedagogical discourse. This issue led the instructor to encourage the sharing of difficulties in the teaching processes or the processes of the analysis of the observation lessons and to present them as a good opportunity for peer learning and the enrichment of their ways of dealing as a part of the professional development.

This chapter of coping with challenges in the teaching-learning processes of the teachers in the professional learning community was intended to create collective responsibility and to establish a culture of continuous improvement. The process of the transformation of the teaching staff into a professional learning community may be perceived as invasive and threatening, and therefore it is important to establish in it the ability to cope with change alongside sharing and willingness on the part of the teachers and the instructor. The instructor must “see” and understand the group as a human system that operates on the basis of connections among the members and must strive for the teachers to learn about themselves and the way in which they perceive their profession as teachers of mathematics. The challenge facing the instructor is to identify the processes that occur in a group and to channel them as required for the need of the fruitful pedagogical discourse promoting learning-teaching. This is a process that lasts time and requires investment, recruitment, and the creation of conditions that support the teachers who are partners in it.

7.5 Summary and Conclusions

The concept of “professional learning community” is based on theory that addresses social learning (Wenger, 2007). One of the prominent characteristics of professional communities is that they see the partnership between their members to be a force that motivates and advances the learning. In other words, the very encounter and dialogue incorporated in the shared work enable the community members to support the learning of one another through reflection, feedback, and sharing of knowledge and teaching and learning skills.

The present research study examined processes of teaching through a model of peer learning in the professional learning community and examined how it influences their professional development, so as to improve the students’ achievements. In this research study, the professional development of the teachers is apparent in the broader context of the professional culture, in other words, a culture of collaborative professionalism that creates change in the teachers’ professional learning perception.

In the research community, patterns of acceptance and reciprocity were created between the development of the teacher as an individual and the development of the community as a professional collective. The research findings indicated that the teachers felt that their membership in this community gave them a meaningful advantage. Their self-image increased and constituted fertile ground for the building of a safe learning space and the performance of reflection on their ways of teaching. The community enabled every teacher to develop professionally and personally as a partner in active learning that occurred for a lengthy period of time. It is clear that in this community the personal facet that was based on reciprocal relations between the individual and the group was prominent. In the process of the building of the partnership, the teachers identified personal and interpersonal generic skills required in our contemporary innovation-rich society (Vieluf et al., 2012). The uniqueness of the community of teachers regarding other learning groups of teachers is that the teachers saw the partnership between them to be the force that motivates and advances their professional work. Here is the place to note that the focus in the research community is not only on the learning that the single teacher experienced but also on the learning of the entire collective. The encounter and joint pedagogical discourse enabled the community members to create norms of collaborative work, openness, and insights following discussions that ensure from lesson study. In this way, the teachers' self-confidence in the choice of the ways of teaching was strengthened, and it was found that as a result of these processes there was among the teachers the transition from an individualist work model to the model of teamwork. The teachers shared the professional responsibility, opened the "door of their classroom", and shared personal insights that arose from their participation in the community. An important conclusion that arises from this research study is that the community created for the teachers the opportunity for different learning, which is participative and inclusive, and this through case studies, data collection, presentation of questions, analysis of lessons, reflections, and then again.

Another aspect in the process of the building of partnership in the community was the creation of infrastructures of time resources and professional support that enabled teachers in the community to improve their teaching; this infrastructure was based on interactions between the community members that were characterized by true and

professional collaboration. The expression of belief in the teachers' ability to innovate, to create, and to act for change, both in the professional knowledge and in the ability to lead to change and to improve the ways of teaching, contributed to this greatly.

The trust, respect, and reciprocal support constituted a basis for quality educational activity, and the community served as a personal and professional home for mathematics teachers. In the work process, the teachers were exposed to theories and practices, and the instructor encouraged them to find for them support in the theoretical knowledge they acquired and even to be partners in the creation of this knowledge. The knowledge acquired in the framework of the pedagogical discourse created a system of learning in which the teachers shared the instruments and reflective experiences based on the analysis of evidence and representations from the observation in the lessons. Complete transparency was created in the pedagogical discourse and peer learning, which encouraged investigative learning, renewal of teaching methods, and integration of diverse didactic means in the lesson as a response to a heterogeneous class. In this way, the teachers in the community connected in practice between the learning in the group and the way in which they taught in their classes.

Another characteristic in the creation of the partnerships in the community was the climate that was created in the community and was characterized by reciprocal respect, caring, open dialogue, and empowerment. The pedagogical discourse that occurred in the community was not intuitive but relied on insights from the observation of lesson study and developed from the experience in the shared learning processes. The teachers felt more confident and developed a positive approach to coping with the challenges that arose in the learning community.

To summarize, the professional learning community offered to the teachers a unique and professional learning environment. It provided for the teachers opportunities for advancement and professional development and influenced their effectiveness at work. The community saw in each and every teacher human capital that should be cultivated and proposed a learning environment in which they responded to the individual's needs in a constant process of learning through the continuous support of the teachers. The

professional development, as described in the present research study, served as a basis for the development of the learning community as a learning organization whose members improve constantly their ability and cultivate together new patterns of thinking.

7.6 Theoretical and Applied Implications of the Research

7.6.1 Theoretical Implications

Many research studies use theories to examine professional communities and social structures (Anfara, Caskey, & Carpenter, 2015) and to explain processes of teaching and learning among teachers during their participation in the professional learning community. The uniqueness of the present research study is that it helps with the enrichment of knowledge that addresses the teachers' professional development.

The research conclusions describe two aspects of change in the professional development of the teacher: personal and professional. On the personal level, the research contributed to the increase of the teacher's confidence, self-image, satisfaction, belonging, and cognitive flexibility. As aforementioned, a stronger self-image on the part of the teacher constitutes in itself fertile ground for the building of a safe learning space and the performance of reflection on ways of teaching. In addition, the research indicates characteristics of peer learning that influence the personal development of the teachers in the community.

In the professional aspect, the research indicates the assimilation and implementation of knowledge from the field of knowledge in constructive ways that encourage teacher activity. The instruments for lesson study promote the teachers in their teaching and give them opportunities for reflection following experiences and interactions as a part of their professional development (Gess-Newsome, 2015; Verhoef et al., 2015). The research indicates also the broadening of the content field knowledge among the teachers in the community, and this because of the knowledge they acquire during in-depth pedagogical discourse. This conversation is based on the findings and evidence, their re-

examination, and sometimes the disputing of them and the thinking about their meaning. This is a professional change that is at the heart of the teachers' pedagogical ability.

The uniqueness of this research study is that the community members “breathed life” into the theories that address the professional development of teachers and made them into activity that is performed in actuality and into routines that are an inseparable part of the activity of the learning community (Lieberman & Miller, 2016). The teachers incorporated into the practice contemporary theories and made them into a sustainable reality. This research study conceptualizes these routines through the theory and actualizes them through the building of a fruitful pedagogical discourse, peer learning, and belonging to a unique group with shared goals (Wasilk & Hindman, 2011).

7.6.2 Applied Implications

In addition to the contribution of the research in the theoretical aspect as mentioned above, it is possible to indicate the applied contribution to the educational field. The collaborations among the community members examined in the research, which have the goal of the investigation of the learning and teaching processes using the lesson study instrument, enable the teachers and the instructor to participate in a learning environment that is innovative and different from the traditional professional environment they knew beforehand. This professional learning community identifies the teachers' needs, focuses its goals, and understands their meanings and implications. These processes led to the building of a unique model that includes the implementation of inquiry processes, pedagogical discourse, and peer learning. These means offer collaborative teaching knowledge, improvement of practices, and assimilation of innovative pedagogies in teaching.

The research indicates the need for an in-depth change that will support the professional development of the teachers and will advance it. The vision at the basis of the research is the development of a professional culture that will connect between theory and action. The work method of the professional community reflects a change in the ways of learning and professional development and in the professional culture of the teachers in the

education system in Israel. The idea behind the development of the professional community is learning during experience and inquiry and not only through the acquisition of orderly knowledge of outside experts that is accompanied by explanations and illustrations. The acquisition of this “active” knowledge relies on the perception of constructivist social-cultural learning. This is a new format of learning through experience in the field and acquisition of new concepts. The innovation in the research is the creation of a unique model of professional development, which is very different from the classic model of short-term in-service training courses that have no sequence and continuity or in other words do not enable a learning process over time. In-service training courses in the spirit of the classic model are “dropped down” by the leaders of policy in the Ministry of Education and are not planned to provide an answer to the needs of the field of the school and the teachers. The teachers’ voice is not heard in these in-service training courses, and for the most part they feel that they do not derive from them benefit.

The research findings indicate that teaching and learning are entwined and occur in a continuous and complex process, which emphasizes the responsibility and commitment of all the participants in the community. The uniqueness in this learning perception is that the center of gravity shifts from the teaching of the single teacher to the teaching and learning of the group as a broad ecological system. The collaborative and dialogic discourse created in the community is based on the perception that knowledge is formed from discussion in which all the sides are active and are interested in building new and meaningful knowledge in a way of thinking, wondering, and coping with conflicts. This professional learning community creates a collaborative culture of the research of the practice.

The research led to the building of an innovative model based on the following principles:

- Continuous learning and investigation of the practice. The continuous learning is an infrastructure for all activity in the community. The community members are actively involved in the research of the practice, and this process inspires thinking,

challenging, erodes the ways of work and common patterns, and facilitates in the building of knowledge and contemporary social-cultural understandings.

- Creation of knowledge relevant to the organization's needs. The shared responsibility of the community members invites the use of research skills and the creation of new knowledge.
- Building of partnerships. Collaborations constitute a main component in the work of the professional learning community.
- Teacher activity. The teachers in the community act constructively for the purpose of their and their colleagues' professional growth.

This applied research broadens the knowledge that addresses the contribution of peer learning and offers to broaden the learning environment of the teachers through the focus on reflective thinking on the practice and ways to improve the students' achievements. The model presents a new framework of social and intellectual participation in the professional learning community and creates new norms of interaction for the implementation of theories, interpretation and analysis, conceptualization, and re-thinking. These processes would not be expressed if not for constant reflection and in-depth understanding of the contexts in which the teachers act. The model of the community requires of its members intellectual, social, and emotional work, including the identification of emotions, caring, and institutionalization of positive systems of relations with colleagues in the community so as to cope more effectively with challenging situations.

In the model, it is possible to identify the components of teaching of the best lesson: the teachers identify teaching principles meaningful to the skills of the 21st century and are aware of the process of learning they undergo during the lesson study. This process increases the internal motivation, improves professional abilities, creates social norms, and establishes procedures in the class and in the community. The dialogue space between the community members provides them with protection, security, and sense of belonging to a quality group of teachers. The teachers' commitment to authenticity and respect for the colleagues in the pedagogical discourse is vital to the implementation and assimilation of

the model. In the research, the power of the professional community to empower the school in particular and the education system in general is discovered. It improves the educational leadership and provides instruments for the improvement of the processes of teaching and learning in the school.

To conclude, the model studied in this research is based on long-term learning in a professional learning community, on the tightening of the relationships between it and the school environment, and on teaching practices tailored to the authentic social-cultural constellation of the teachers and the schools. The uniqueness of the model lies in the creation of partnerships of inquiry-based learning based on the analyses of events from the class, and the understanding is that without these partnerships it is not possible to effect a systemic and professional change in the teaching profession. The research constituted a challenge for the instructor of the community and the teachers and raised the awareness of the school leadership for the pedagogical and social changes derived from the global learning trends in the 21st century.

7.7 Social Implications of the Research

This research study examined professional development in a unique community of mathematics teachers through lesson study and studied a model of pedagogical innovation implemented in it as an approach to learning that incorporates personal, professional, and social aspects. The teachers in the community developed a culture of cooperative learning and self-critical observation, and as a researcher I see these processes of shared inquiry to be very important. In my view, the creation of a framework for investigation is one of the main objectives in professional development, since it invites discussions and inquiry-based learning and assimilates in it a reflective culture.

It is recommended to implement this model of pedagogical innovation in additional organizations, with the aim of creating norms of collaboration and partnership not only in the education system. Organizations that will adopt the principles of the model examined in this research study will lead to the creation of relevant knowledge and will develop

human capital through learning from the organization and the development of decentralized leadership that will cause the growth of a new professional identity.

The professional learning community in this research study can constitute an example for organizations, industries, and companies. Professional communities can grow in the organization and be under the responsibility of the people who belong to it, as in this research study the instructor of the community is a part of the community of mathematics teachers.

The different aspects in the model studied here, such as peer learning, sharing knowledge, creation of new ideas, solving problems from the field, development of expertise, and the growth of leaders from the organization, are the basis for the best assimilation of learning processes and have the power to contribute to the advancement of topics according to the organization's goals. It is necessary to emphasize the best climate and systems of relations in the professional community as strengthening the feeling of belonging of the members. Organizations that will adopt a model of a professional community will be meaningful for their workers and will empower them personally and professionally.

To summarize, the professional learning community in the organization is formed from a collection of people with a personal and professional "self" who belong to it and constitutes a framework for innovative and collaborative learning.

7.8 Recommendations and Future Research Directions

The research study examined the professional development of teachers of mathematics who participated in a professional learning community, and it is possible to identify that it led to cultural, pedagogical, and educational change among the education personnel. On the basis of the research findings, it is possible to formulate applied recommendations and future directions of research, as described in the following sections.

7.8.1 Applied Recommendations

The research described in this work presents a range of factors that influence that professional development of teachers in a professional learning community. As a “preface” of the formation of the recommendations, it is possible to identify that in the community emphasis is placed on the training of teachers and the belief that they are worthy and capable of leading change in the patterns of their work. In the building of a professional community, it is necessary to recognize the teaching knowledge that exists among the teachers and their educational and pedagogical expertise. It is important that this knowledge become the province of all the teachers in the schools, contribute to the development of their expertise, and help them in their work. In addition, it is necessary to assimilate in the community ongoing professional learning that revolves around teaching practices and to develop strategies that will facilitate the channeling of the knowledge and expertise of the teachers to the increase of the quality of the teaching in the classroom.

It is important to allow the teachers to make decisions and to make choices that pertain to their professional development in general and to the specific content knowledge in which they engage in particular. This will be accomplished through a professional factor trained to instruct and lead the professional learning community. In addition, it is necessary to expose the teachers in the community to patterns of learning occurring all the time as a result of the work and not separate from it. It is necessary to allow them a structured, effective, and regular space and to accompany in a professional manner a culture of pedagogical discourse. The teachers desire more than anything the professional encounter with their colleagues and are willing to contribute from their abilities and knowledge in local and systemic circles.

It is necessary to build in the school framework a process of professional development based on teacher agency and acknowledging its importance. In other words, it is necessary to encourage teachers to be active generators of processes of teaching and learning. This process will encourage the teachers’ autonomy and will build the knowledge “from bottom up”. In the path of the teachers’ professional development it is necessary to

allot time, space, and quiet for listening and internal observation of the processes they undergo in the learning community: for instance, the carrying out of reflection regularly and the analysis of experiences that contribute to the development of the judgment ability and the implementation of instructional and educational discretion. The education system must form learning communities in which the teachers will solve problems that arise in their work and will share the responsibility for the success of their colleagues and students – all so that the learning will be directed to continuous growth and not to evaluation.

As a researcher, I recommend the building of professional learning communities in the education system as a part of meaningful pedagogical and professional development, which will lead to diversification, enrichment, and constant improvement of the teaching processes.

7.8.2 Recommendations for Future Research Directions

Innovative thinking and action in the education systems around the world are characterized by a constant process of development. The findings of this research study raise additional questions that should be investigated, with the aim of broadening the knowledge about the factors that influence the professional development of teachers in general and the professional learning communities in particular. Therefore, there is a need for additional research studies that include long-term observations, analysis of simulations of events in the community, and documentation of a work portfolio that includes the analysis of products of teachers who participate in the community.

Regarding the research limitations, future research studies should examine the questions asked in the present research about different disciplines, schools, and population sectors different in their culture and characteristics, additional study subjects, and a broader range of teachers in additional age groups. Future research studies can examine the extent to which it is possible to implement the proposed model in other cases.

It is recommended to carry out research studies that will examine the professional learning community for a longer period of time, and not only during one academic year,

and to compare the results of the learning in the community and its effects to a control group of teachers who do not participate in such a community.

Additional research studies may enrich our understanding and complete the picture about the professional learning community as a special organizational framework for the professional development of the teachers. It is important to accompany the processes of professional development with processes of research and assessment and to build professional criteria for a professional learning community, so as to establish and broaden the knowledge about the effectiveness of this model. Future research works will contribute to the knowledge existing in Israel and in the world in all that pertains to the professional development of teachers through learning communities.

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Appendices

Appendix Number 1: Pedagogical Conversation following the Observation of the Mathematics Lesson

The collection of evidence from the observation in the lesson, actual practice. Document and analyze the documented conversation using the following dimensions. Try to find quoted examples in the observation of each one of the dimensions: dimensions for the analysis of the conversation that describe the lesson using evidence.

- Emphasize what happened in the lesson (issue, goal, strategies, skills, mediation actions, etc.)
- Raise different issues and choose one issue for discussion
- Ask the teacher clarification questions in connection to the chosen issue
- Analyze the issue: causes and implications, through the use of evidence
- Summary and reflection: “what do I take from the conversation?”
- Make suggestions, alternatives related to the issue. Promotion of the learning, thinking, and conceptualization.

Date: _____ Lesson Topic: _____ Age Group: _____

Diagnoses	Observation: What Did I See? What Did I Hear?	Comments
Manner of sitting		
Use of mathematical language (examples)		
Types of teacher questions (examples)		
Means for the diversification of the lesson, use of aids		
Manner of feedback for the students (examples)		
Ways of collecting ideas for the central idea (examples)		
Socio-mathematical norms in the lesson (examples)		
Reference to early perceptions (examples)		
Linkage to previous knowledge (examples)		
Interactions among the students themselves		
Other		

Appendix Number 2: Informed Consent Form for Participation in the Research

The present research study addresses the professional development of mathematics teachers in the elementary schools in the professional learning community through lesson study.

You are asked to respond to the questions of the interview from a viewpoint that reflects your personal experience. There are no correct or incorrect answers.

Your participation in the research is voluntary. It is possible to end the interview at any stage, if you feel that you do not want to continue, and there will be no negative implications for you.

The personal details and information that will be given by you will be confidential and anonymous and will be kept by the researcher and will not be provided to any other factors. After the processing of the material for the research purposes, it will not be possible to identify any research participant.

If you are interested, then I will be happy to share the research findings with you.

I thank you for your participation.

1. I, the undersigned:

Last name: _____ First name: _____

- A. Do declare that I consent to participate in the research study as described in this document.
- B. Do declare that I received an explanation from:

Researcher name: _____ about what was said above.

2. Researcher declaration:

The above consent was obtained by me, after I explained to the research participant all the above and ascertained that the participant understood my explanation.

Researcher name

Signature

Date

Appendix Number 3: Interview Guide

Dear teacher,

The goal of this interview is to collect data about the professional development of the teacher following a process of lesson inquiry in a process of peer learning in the professional learning community.

You are asked to respond to these questions from a perspective that reflects your personal experience. It is important that you respond to the questions in a true, honest, and detailed manner.

The interview is anonymous, and your answers will be used solely for the purposes of the research study.

I use a recorder to ensure accuracy and completeness. The questionnaire will take about an hour and a half.

I thank you ahead of time for your cooperation and your contribution to the promotion of the knowledge and understanding in this topic.

Sincerely,

Galit Magrafta

Background Questions

Name:

Age:

Gender:

School: State / State Religious

Years of Work Experience: (at the teacher position and the others)

Education:

Did you complete a training program for teaching mathematics?

Present Position:

Did you participate in activity for professional development during the year and if so, what was it and how long was it?

Questions

Professional Development of Teachers

1. What is for you professional development? (general knowledge)
2. What are the contents that you acquired in the professional development activity in which you participated during the past year? To what extent did they have a positive impact on your teaching? (Following your participation in this professional development, were there changes in your manner of work? Describe.)
3. To what extent are you interested in continuing to participate in the coming year in activity of professional development? Describe why. (Would you recommend to peers at work to participate in this in-service training course?)

Professional Learning Community

1. Tell about the processes that were meaningful for you in the professional learning community.
2. Describe a situation/conversation in which you were a partner in the professional learning community. How did you benefit?
3. How did your presence in this community contribute? Give an example. (What did you bring of yourself to the community?)
4. What did you feel at the end of every session of the professional learning community? How was this expressed in your work?
5. Cooperation is a main characteristic of the professional learning community. How was the cooperation expressed in the processes of learning in the community?

6. What difficulties did you identify in the interaction between members of the group in the community of learners?

Peer Learning

1. Did your participation in the peer learning group contribute to you in personal and professional terms? Give examples.
2. Indicate tools you acquired in the process of peer learning.
3. Which tools/practices you were exposed to in the process of peer learning will you implement in your teaching?
4. How is the instructor's role expressed in the leading of the community?

Lesson Inquiry

1. What is special in the process of the lesson inquiry as a tool for professional development?
2. In your opinion, what is the importance of reflection after the lesson in the process of lesson inquiry?
3. Bring examples from the process of lesson inquiry that left an impression on you.
4. Tell about the successes and difficulties in the process of lesson inquiry in the learning community.
5. Did you learn this year pedagogical methods suited for the 21st century?

Is there something that we missed or something that you think we need to know?

Is there something that perhaps I did not understand correctly?

Would you like to add ... general comments that were not expressed in the interview ...

Appendix Number 4: Interview

Dear teacher,

The goal of this interview is to collect data about the professional development of the teacher following a process of lesson inquiry in a process of peer learning in the professional learning community.

You are asked to respond to these questions from a perspective that reflects your personal experience. It is important that you respond to the questions in a true, honest, and detailed manner.

The interview is anonymous, and your answers will be used solely for the purposes of the research study.

I use a recorder to ensure accuracy and completeness. The questionnaire will take about an hour and a half.

I thank you ahead of time for your cooperation and your contribution to the promotion of the knowledge and understanding in this topic.

Sincerely,

Galit Magrafta

Background Questions

Name:

Age:

Gender:

School: State / State Religious

Years of Work Experience: (at the teacher position and the others)

Education:

Did you complete a training program for teaching mathematics?

Present Position:

Did you participate in activity for professional development during the year and if so, what was it and how long was it?

Questions

Professional Development of Teachers

1. What is for you professional development? (general knowledge)
2. What are the contents that you acquired in the professional development activity in which you participated during the past year? To what extent did they have a positive impact on your teaching? (Following your participation in this professional development, were there changes in your manner of work? Describe.)
3. To what extent are you interested in continuing to participate in the coming year in activity of professional development? Describe why. (Would you recommend to peers at work to participate in this in-service training course?)

Professional Learning Community

1. Tell about the processes that were meaningful for you in the professional learning community.
2. Describe a situation/conversation in which you were a partner in the professional learning community. How did you benefit?
3. How did your presence in this community contribute? Give an example. (What did you bring of yourself to the community?)
4. What did you feel at the end of every session of the professional learning community? How was this expressed in your work?
5. Cooperation is a main characteristic of the professional learning community. How was the cooperation expressed in the processes of learning in the community?
6. What difficulties did you identify in the interaction between members of the group in the community of learners?

Peer Learning

1. Did your participation in the peer learning group contribute to you in personal and professional terms? Give examples.
2. Indicate tools you acquired in the process of peer learning.
3. Which tools/practices you were exposed to in the process of peer learning will you implement in your teaching?
4. In your opinion, what is the role of the instructor in the process of peer learning? What inspiration did the instructor instill in you?

Lesson Inquiry

1. What is special in the process of the lesson inquiry as a tool for professional development?
2. In your opinion, what is the importance of reflection after the lesson in the process of lesson inquiry?
3. Bring examples from the process of lesson inquiry that left an impression on you.
4. If you needed to plan such a process for teachers in the coming year, what would you adopt and what would you change? (Strengths and recommended aspects for improvement)
5. Did you learn this year pedagogical methods suited for the 21st century?

Is there something that we missed or something that you think we need to know?

Is there something that perhaps I did not understand correctly?

Would you like to add ... general comments that were not expressed in the interview ...