

Learning Communities for teacher research: Experiences of the GdS and GETEMAT

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Abstract

This paper presents some reflections on different conceptions of teacher knowledge and learning according to Cochran - Smith and Lytle. We sought to characterize the knowledge produced in two learning communities of teachers: GdS (Saturday's Group) and GETEMAT (Group of Studies and Pedagogical Work of Teaching Mathematics). The sources of information were books and academic theses produced by GdS throughout its existence, the observations of GdS meetings held in 2012. In addition to data collected during the development of the research project that led to the GETEMAT. The study highlights the different types of learning and knowledge produced in each group and emphasizes the differences and points of convergence in the constitution of these communities. The results indicate that both groups are learning communities of teachers who produce knowledge of the practice from the reflections on their experiences in the classroom. Each group has its development marked by historical and cultural diversity of cities, universities and school environments in which they live. The experiences of GdS and GETEMAT point to the importance of collaborative groups to problematize the process of mathematics learning and teaching.

Keywords: mathematics education; teacher education; learning communities; inquiry

1. Introduction

The aim of this paper is to describe the learning and knowledge produced by two collaborative groups of basic education teachers that have for principle the formation of a learning community of teachers to reflect on the process of teaching and learning mathematics in basic and secondary school.

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To describe the development of the activities of each group, we used the following sources of information: Two PhD theses that describe the history and the first results of the *Saturday's Group* (GdS) (Jiménez Espinosa, 2002; Pinto, 2002); Four books written by members of the *GdS*: *Action Research Group in Elementary Algebra*, 2001; Fiorentini and Espinosa, 2003; Fiorentini and Cristovão, 2007; Carvalho and Conti, 2009. Besides from the observations collected during GdS's meetings of the first half of 2012.

Other sources of data collection were the observations of the activities compiled in the period 2009 to 2011 of the Research Project GETEMAT - Group Study in Mathematics Education: *Continuous Education of Elementary School Teachers for the Teaching of Mathematics*, which was supported by National Council for Scientific and Technological Development - CNPq, financing organ for scientific researches in Brazil (Author, 2009, 2011).

From the theoretical framework (Cochran-Smith & Lytle, 1993, 1999, 2009 and Fiorentini 2004, 2011) we identified in the groups converging features between them and also singular points. In particular, we studied the type of knowledge such groups produced according to the work of Smith & Cochran-Lytle (1999).

According to Cochran-Smith and Lytle (1993), the research of practioner represents a special form of knowledge about teaching and learning that can transform the academic research in the area. The authors argue that teacher's research represent a challenge to the consensus that exists on the relationship between theory and practice, school and university, between research and educational reforms.

These authors note that the constitution of an inquiry community of teachers faces obstacles of various orders. Initially, there is a whole range of reasons why the teaching profession is not considered important, such as: Initial formation deficient, lack of standardization how to operate the work of teachers, lack of confidence by society, the teachers' difficulties keeping to date with the productions researches and teaching in the area among others. They warn that beyond these difficulties highlighted by the critics to the teaching profession, the constitution of a investigative community of practice have been barriers related to an organizational culture of schools and universities, the traditional guesses about the process of teaching and learning, the traditional views of production of new knowledge in the field of education.

Cochran-Smith and Lytle (1993) highlight four obstacles to the constitution of an investigation community: The isolation of teachers, the self-sufficiency of the good teacher, the vision of the teacher as a technical and the own reputation of educational research. According to authors, the overcoming of these obstacles will enable the inclusion of an increasing number of teachers interested in investigating their practice and consequently produce local knowledge about teaching and learning that will enable significant changes in educational systems. In this perspective, both groups were able to break through these barriers and have managed to be as communities of inquiry.

The results indicate that the groups have in common the fact that forming themselves into a learning community or *communities of inquiry* according to Cochran-Smith & Lytle (1993) and Fiorentini (2011). However, the histories of each revealed their own constitution and distinct pathways that are directly influenced by the location and culture of the place where the groups have developed.

2. Teacher learning communities: GdS and GETEMAT

Teacher learning communities, according to the definition term prepared by Cochran-Smith and Lytle (2002), is part of a new perspective on teachers' education and professional development. This term is used to refer to projects, cooperative and collaborative programs that bring together future teachers, teachers with experience in partnership with university professors who support the continuing education of members of the group. The authors also define communities as groups consisting of both new and experienced teachers who gather for a time, in order to get new information, reconsider their knowledge and their prior beliefs and build their own ideas and experiences to improve their practice and learning of their students both in basic education as other segments of education. The authors present the following entry in the conceptualization of teacher learning communities: "*The teacher learning communities refer to an intellectual space as well as designate a particular group of people and sometimes a physical space. In this sense, communities are settings intellectual, social and organizational support continued professional growth of teachers, providing opportunities for teachers to think, talk, read and write about their daily work, including their social, cultural and political issues in a planned and intentional*" (Cochran-Smith & Lytle, 2002, pp. 2462-3).

Cochran-Smith and Lytle (1993) based on the analysis of several groups of teachers set a categorization of the kinds of communities, their features and the possibilities that provide for raising educational questions and to promote the participation of teachers in research. The categorization is based on the dominant features presented by the communities on how organize time, use the talk (discussion), construct texts (and select bibliographies of study) and how to interpret the educational activities. From the characteristics pointed out by Cochran-Smith and Lytle (1993, 2002, and 2009) for teacher learning communities, we intended to highlight which of them can be verified in the groups studied by the authors of the article.

2.1 GdS and GETEMAT: the beginning

Fiorentini (2011) notes that the Saturday's Group was formed, for over 10 years as a collaborative group that gathers elementary school teachers, future teachers, graduate students and professors interested in studying, share, discuss, investigate and write collaboratively about the practice of teaching and learning mathematics in schools under an exploratory and investigative approach. The introduction of the fourth book of the GdS (Carvalho & Conti, 2009, p. 7) provides the following characterization of this group: *"We are a group of teachers who teach math class and, as the name indicate (Saturdays' Group - GdS), we meet on Saturdays to reflect and analyze the pedagogical practice in mathematics from a micro perspective (classroom) and a macro (policy and public management Brazilian education). Moved us the idea that the teacher is a producer of knowledge and the practice of this production occurs as it transforms the classroom into a field of research"*.

In this brief description are summarized the main points of the history of GdS that has its origin in a group of teachers interested in discussing the teaching and learning of elementary algebra and found a space in the Faculty of Education at Unicamp to meet and discuss. The main feature of works and studies developed by the GdS is the collaborative work. An important noticeable aspect was the fact that the group has had its origin outside the university, however, to constitute the members sought the support of the university. In the introduction of the first book of the GdS (Action Research Group in Elementary Algebra, 2001, p. 1), the authors present their work as follow: *"The stories presented here are the result of a work being shared three years ago by a group of math teachers."*

Participating in this group, whose name is Action Research Group in Elementary Algebra, fourteen teachers from public and private schools in the city of Campinas and region, three PhD students and a university professor, we meet weekly on Saturday mornings since March 1999”.

Since the beginning, another hallmark of the GdS is to gather teachers of elementary school, undergraduates and graduate students and professors. Still on the presentation of the first book of the group we have the following characterization of the work developed: *“ Our principal aim is to discuss and reflect (on) our pedagogical practice in the teaching and learning of elementary algebra. By the way, in the group, we assume that practice as a point of departure and arrival in our weekly discussions. These discussions, however, are not limited to the teaching of elementary algebra. Countless times, given the difficulties and challenges that we see facing the school routine, the meetings become a space to express them. Apart from occasional meetings theoretical-methodological study, involving reading and discussion of texts, there are investigative actions that can be performed collectively or individually. When the activity is of interest to all, this is planned, implemented and evaluated by all. When investigative activity is due to a problem or particular interests, this gets collaboration and analysis of all group participants. Thus, the agenda of the meetings is planned collectively.”* (Action Research Group in Elementary Algebra, 2001, p.2).

From the foregoing, it can be said that the group GdS, since its conception sought to form a learning community of teachers that focuses mainly on the practice of research, with the objective to create what Cochran-Smith and Lytle (1993) characterize as investigation communities.

In this context, also fits GETEMAT which was conceived as a research project proposed by the university, which sought to integrate the academic community of the university (faculty and students of the Faculty of Education of the Federal University of Rondônia / *Campus de Vilhena*) and elementary school teachers of Vilhena city, in a group to reflect on the teaching and learning of mathematics. The main purpose of GETEMAT was to develop a proposal for teacher continued education for the teaching of mathematics based on the formation of a collaborative study group. The question that directs the actions developed by the project was the following: *“What difficulties teachers of the early years of elementary education in schools of Vilhena city present with respect to the understanding of the mathematical contents and the use of teaching strategies of this discipline in the classroom?”* (Müller, 2011, p. 2). From the search for answers to this question, since 2009, the group GETEMAT was formed.

The group meetings took place every two weeks and the discussions were proposed by members from their doubts and concerns about the mathematical contents and how to develop them in the classroom.

Thus, the characterization of *community learning* proposed by Cochran-Smith and Lytle (2002) appears in the account of the origin of both groups studied. That is, both are formed by elementary school teachers, future teachers and professors who discuss the practice from an exploratory perspective. The starting point for the discussions and end point, in either group, is the work undertaken by teacher in the classroom.

2.2 GdS and GETEMAT: theoretical conceptions

The second book of the GdS (Fiorentini; Jiménez, 2003) tries to situate the theoretical conception from which the work of the GdS developed. According to the authors, "*The action research was seen as a methodology of reflective practice, connecting theory and practice, taking as the point of departure and arrival the professional practice of teachers and as a mediation educational theories (especially Mathematics Education) and research on the practice of each.*" (Fiorentini & Jiménez, 2003, p.6). The authors, however, emphasize that: "*[...] although this methodological approach has been in part contemplated by the Group, we developed our own version with emphasis on the fact that teachers registered and written in narrative form, about their research and experiences with the practice.*" (Fiorentini & Jiménez, 2003, p.7).

Thus, it can be stated that the GdS despite starting their work from the perspective of action research, during the development of the meetings and discussions of the group, created their own perspective to investigate and discuss the pedagogical practice of its members. According to Fiorentini and Jiménez (2003, p. 7-8) the work of the GdS can be characterized as follows: "*[...] exist in group two distinct moments of collective reflection: one before the action - involving all members of the group - consisting of planning the activities to be performed in groups or individually, according to the desire and the possibility of most; another moment of reflection after the action - also involving all members of the group. In the second phase, the teacher who developed the experience tells it for the Group, enabling a process of collective reflection which results in the production of new meanings for who has produced it as well as for the other participants of the GdS.*"

Thus, discussions and reflections that are promoted in GdS also allow the teacher to produce knowledge; activities in GdS assume that the teacher not only consumes theory, but also produces and shares this knowledge with their peers, makes it public and hence this becomes part of what may be called professional knowledge.

Regarding the theorists that supported the proposed of GETEMAT there are also points in common with the GdS. Authors such as Pimenta (2005), Thiollent (1996), Freire (1981, 1993), Fiorentini (2004), and Curi (2005) were relevant to the establishment of the first theoretical interlocutors of GETEMAT. The first idea of the project was that GETEMAT would be developed according to the principles of action research. Besides collecting data for the study of a proposal for continuing education of teachers, there was always the intention to promote changes in the work developed in the classroom by teachers.

In the GETEMAT's meetings were discussed the practice of teachers involved in the project, following the principles of a collaborative working group, organized by Fiorentini (2004) from the experience he had at GdS, Especially the following: Participation in the group was voluntary; All members were responsible for the discussions; The group had a confidence which allowed exposure of the ideas and concerns of all members.

Cochran-Smith and Lytle (2009) point to the importance of action research as a theoretical construct to be considered in the study of learning communities. According to the authors, the notion of research that they develop is consistent with the continuous cycle of action research: inquiry, observation and action. Moreover, note that the essential goals of action research are the development of social practice and commitment of those involved in the practice itself.

Both groups have the theoretical framework of action research, although in the development of their actions, each group has developed its own form of research, especially based on the study of the practice of its members. However, the data demonstrated that the two groups preserve the idea of continuous cycle of action research cited by Cochran-Smith and Lytle (2009).

3. Conceptions of knowledge and teacher learning: the work of GdS and GETEMAT

According to Cochran-Smith and Lytle (1999), teachers learn when they generate local knowledge of their practice, working in a context of research communities, in which theorize and construct their work connected with social, cultural and political issues.

Cochran-Smith and Lytle (1999) present three conceptions of teacher learning based on the knowledge and relationship with the formation and their professional life. According to them, different conceptions of teacher learning imply different ideas on how to promote teacher education, professional development and how to bring or allow changes in school and curriculum. Thus, there are three views on the teacher's knowledge: *knowledge for practice*, *knowledge in practice*; *knowledge of practice*. Each deals with the question of knowledge in a specific way.

According to Fiorentini (2011), these conceptions, although seem to conflict with each other, they compete in different ways in various proposals for teacher training, which often coexist subtly, in the world of education policy, research and educational practice. Additionally, they are cited by people of different positions to explain and justify completely different ideas on achieving the improvement of teaching and learning.

The first conception, *knowledge for practice*, emphasizes the production of academic researchers who generate knowledge through formal theories or use the teacher in order to improve practice. There is a clear separation between formal knowledge and practical knowledge. The academy is seen as the privileged place of construction of knowledge about teaching. The teacher needs to appropriate of this formal knowledge in the process of learning and teaching whatever area of human knowledge. It may be characterized this conception as knowledge outside of school that is brought into this space by the experts called for teachers to update and improve their professional practice.

Knowledge in practice, second conception of knowledge and teacher learning, has as its starting point the knowledge of teacher practice, in other words, the knowledge generated by competent teachers or experts is crucial to produce new knowledge about teaching.

This conception of teacher learning prioritizes that the competent teachers know when they are involved in their practice or reflection on their practice. This means that the produced knowledge is knowledge inside the school space which remains restricted to the space.

The third conception, *knowledge of practice*, emphasizes that there is no separation between formal knowledge and professional practice. According to Cochran-Smith and Lytle (1999) the knowledge required for the improvement of teachers' work is produced when teachers treat their classrooms and schools as places for intentional investigation. At the same time these teachers treat the knowledge and theory produced by other generators of questions and interpretations, enabling the construction of knowledge within the school that may influence knowledge from outside, especially academic works in the field of education.

Despite distinct, the authors note that the lines of separation between the three concepts are not perfectly drawn and the language used to describe them are not mutually exclusive what often creates confusion among those who use them in the description of proposed formation for teachers. Furthermore, the authors note that there is no ranking between the different types of knowledge, there is any worry to consider a better concept than others. Kinds of knowledge are different points of view of learning for the teacher.

From the perspective of *knowledge of practice*, teachers learn collaboratively in research communities, where the participants learn with each other and build a significant local knowledge, research is viewed as part of a larger effort to transform education within the larger context. This characterization provides a quite comprehensive description of the work done in GdS. This is confirmed through the accounts of members who were enrolled in the four books of the group Action Research Group in Elementary Algebra, 2001; Fiorentini and Espinosa, 2003; Fiorentini and Cristovão, 2007; Carvalho and Conti, 2009.

Using the types of knowledge presented by Cochran-Smith & Lytle (1999), it can be stated that the proposal to create a study group - GETEMAT - to discuss the knowledge and practice is in accordance with the third project presented. The intent of providing the creation of an educational research community, presented in the research project (Müller, 2009) implicitly carries the idea of forming a research group on the practice having as background the math classes.

However, in developing of the project we observed a perspective that is closer to the first conception presented by Cochran-Smith and Lytle (1999). Meetings of the group GETEMAT produced knowledge to practice. In the discussions there was always a concern with the study of mathematical content, the general theories of mathematics education, learning, teaching and assessment. There is great difficulty for teachers to consider their practice as an important resource in the generation of knowledge. Teachers do not see themselves as producers of knowledge, but as users of the knowledge produced by others. There was the concern of acquiring *knowledge* to improve practice.

The members of the group GETEMAT were concerned gain knowledge that would be useful in the classroom. Following on are some comments from teachers who participated in the GETEMAT recorded at the end of each meeting, called Memorial Meeting: *"Today's meeting came to remedy a difficulty about the decomposition of numbers. And I realized that while teacher I was making the same mistakes."* (ES, Memorial, September 10, 2009). *"This meeting was very important because we talk about the importance of activities worked in the classroom with the concrete material: abacus, Cuisenaire bars and rods of, Montessori materials. With these materials we can involve many activities in mathematics content, as well as make sense to the student. For this reason, I intend to work with my students in class."* (Anonymous, Memorial, April 06, 2010).

"During the first meeting the theoretical concepts and proposals suggested seemed interesting. My aim with the course is to remedy some difficulties in teaching the mathematical content to students in a truly meaningful manner." (AD, Memorial, March 25, 2011).

Observations of meetings of the GdS occurred during the first half of 2012. The records of the researcher allow observing a proper motion of the group with respect to the ongoing discussions. This movement observed is characteristic of GdS over its history: at each meeting the members scheduled the work for the next meeting and the role of teachers of elementary school is a key differentiator in the development of what was planned. Regardless of being a teacher of elementary school or university professor or student, everyone is responsible for presenting seminars on theory and about their practice.

In the meetings of the group GETEMAT the agenda for discussion was also planned by the group. However, the responsibility for development of the proposed activities has always been from the professor of university.

The group coordinator chose the texts and authors related to the topics chosen by the group, and activities to be developed by teachers in school.

The discussion on the agendas of GETEMAT's meetings in contrast with what was observed in the first half of 2012 by the GdS, show that the two groups have the characteristic of privileging the space of collaborative groups as a space for teaching formation, regardless the group be formed from the interest of teachers working in basic education, such as the GdS, or those groups made from a proposal from the university like GETEMAT.

These observations and bibliographical material and documentary also highlight the proper way that each group entered in different communities have their movements marked by historical and cultural diversity of cities, universities and school spaces in which they are inserted.

Both groups aim to discuss the practice from the theory. But especially, the two groups, according to their own characteristics, seek to improve the teaching of mathematics in school. In this process, at times, produce *knowledge for practice* in others, *knowledge in practice* or *knowledge of practice*.

4. Study results

The experiences of GdS and GETEMAT point to the importance of collaborative groups to problematize the process of mathematics learning and teaching. The work developed by Cochran-Smith and Lytle (1993, 1999, 2009) present a theoretical framework that aims to provide a more detailed understanding of the knowledge generated in teacher learning communities: it is *inquiry as stance*. They describe the possibilities of knowledge production that teachers develop to take over the *inquiry as stance* in learning communities. Cochran-Smith and Lytle (2009, p. 119) assert that: "*The construct, inquiry as stance, is intended to offer a closer understanding of the knowledge generated in inquiry communities, how inquiry relates to practice, and what teachers learn from inquiry*".

Thus *inquiry as stance* extends not only to basic education teachers, but university – and college-based teachers, teacher educators and other professionals working in educational spaces (formal or informal). We could say that besides a concept, *inquiry as stance* can be seen as a perspective of life.

In this perspective, the work of the GDS as well as the GETEMAT allow the development of an investigative approach by the teachers involved, producing different learning and knowledge that allows rethink the practice of teaching and learning mathematics. The GdS and GETEMAT groups met teachers and future teachers from a proposal to develop a critical and collaborative action research. Both groups may be considered as collaborative groups, who throughout their history have sought to create a space for learning from teachers who participated in their meetings with based on the reflection on their practice.

5. References

- Carvalho, D. L.& Conti, K. (org.) (2009). Histórias de colaboração e investigação na prática pedagógica em matemática. Campinas: Alínea.
- Cochran-Smith M. & Lytle, S. L. (1993). Inside/Outside: teacher research ad knowledge. New York: Teachers College Press.
- Cochran-Smith M.& Lytle, S. L. (1999). Relationship of knowledge and practice: Teacher learning in the communities. Review of Research in Education, 24, 249-305.
- Cochran-Smith M.& Lytle, S. L.(2009). Inquiry as stance: practitioner research for next generation (pp.118-166). New York: Teacher College Press. .
- Curi, E. (2005). A matemática e os professores dos anos iniciais. São Paulo: Musa.
- Espinosa, A. J. (2002). Quando professores de matemática da escola e da universidade se encontram: re-significação e reciprocidade de saberes. [Online] Available:<http://www.bibliotecadigital.unicamp.br/document/?code=vtls000282010&opt=1> (April 2, 2012)
- Fiorentini, D. & Cristovão, E. M. (2007). Histórias e investigações de/em aulas de matemática. Campinas: Alínea.
- Fiorentini, D. & Espinosa, A. J. (org.) (2003). Histórias de aulas de matemática: compartilhando saberes profissionais. [Online]. Available: <http://grupodesabado.webnode.com/news/segundo-livro-gds/> (April 2, 2012).
- Fiorentini, D. (2004) Pesquisar práticas colaborativas ou pesquisar colaborativamente? In Borba, M. (Org.) Pesquisa qualitativa em Educação Matemática (pp. 47-76). Belo Horizonte: Autêntica.
- Fiorentini, D. (2011) A investigação em Educação Matemática desde a perspectiva acadêmica e profissional: desafios e possibilidades de aproximação. [Online] Available:http://cimm.ucr.ac.cr/ocs/index.php/xiii_ciaem/xiii_ciaem/paper/view/2910/1225. (October 10, 2011).
- Freire, P. (1996). *Pedagogia da autonomia*. São Paulo, Paz e Terra.
- Freire, P.(1981). *Pedagogia do Oprimido*. Rio de Janeiro: Paz e Terra.

- Grupo de pesquisa-ação em álgebra elementar (2001). Histórias de aulas de matemática: trocando, escrevendo, praticando e contando. [Online] Available: <http://grupodesabado.webnode.com/news/primeiro-livro-do-gds/> (April 2, 2012).
- Müller, M. C. (2009). GETEMAT – Grupo de Estudo e Trabalho Pedagógico de Ensino de Matemática: Formação Continuada de Professores dos Anos Iniciais Para o Ensino de Matemática. [Online] Available: <http://www.alb.com.br/portal.html> (February 9, 2010).
- Müller, M. C. (2011). Formação Continuada de docentes dos anos iniciais: a proposta do GETEMAT. [Online] Available: http://www.cimm.ucr.ac.cr/ocs/index.php/xiii_ciaem/xiii_ciaem/paper/view/374 (October, 10 2012).
- Pimenta, S. G. (2005). Pesquisa-ação crítico-colaborativa: construindo seu significado a partir de experiências com a formação docente. *Educação e Pesquisa*, São Paulo, v. 31, n. 3, pp. 521-539.
- Pinto, R. A. (2002). Quando os professores de matemática se tornam produtores de textos escritos. [Online] Available: <http://www.bibliotecadigital.unicamp.br/document/?code=vtls000257417> (April 2, 2012).