

## COMMUNITIES OF PRACTICE SUPPORTED BY VIRTUAL COMMUNITIES AND ITS CONTRIBUTIONS FOR THE RE-SIGNIFICANCE OF THE TEACHERS' PEDAGOGICAL PRACTICE

Rosana G. S. Miskulin  
IGCE/Unesp/Rio Claro – [misk@rc.unesp.br](mailto:misk@rc.unesp.br)

Mariana da Rocha C. Silva  
FE/Unicamp/Apoio Fapesp – [marianadarocha@gmail.com](mailto:marianadarocha@gmail.com)

Maurício Rosa  
IGCE/ Unesp/Rio Claro - [mauriciounesp@yahoo.com.br](mailto:mauriciounesp@yahoo.com.br)

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### **Abstract**

This work approaches the construction process of a community of practice, formed by a virtual community, where a problematical position is assumed and common interests and objectives, reflexive actions, dialogues, speeches and shared histories are articulated, making it possible the implications for the re-significance of the pedagogical practice. This context is based on practical communities grounded on technology (computational environments of distance learning; an educational proposal according to the objectives to be fulfilled; the students and/or teachers and the teacher's mediation in the learning process). One of the basic aspects consists in the interactive dimension of this online community of practice, constituted by the TelEduc environment, which allows various forms of communication and contribution to the constitution of knowledge and to shared process. Thus, the teachers start continuously to learn with other teachers and students, continuously updating their knowledge, developing and transforming their pedagogical practices. The performance in these virtual learning environments makes these teachers come across with a new modality of interaction and, therefore, with unknown questions which make them rethink the role they play and their didactic-pedagogical performance. The interactions, contributions and discussions which occurred between Mathematics teachers, students of the discipline of the graduate program: "Didactic Applied to Mathematics Classes", of the IGCE/UNESP, were analyzed. The dimension of representation and sharing of knowledge in online communities of practice and its influences and possible contributions in the practical re-significance of these teachers were emphasized.

**Keywords:** Community of Practice, Virtual Communities, Teaching Practices, Technology, Mathematic Education

## **Introduction**

The process of construction of a community of practice assumes as a premise the natural constitution of a group that seeks to reflect on the proper practice. In this direction, when this process is given by a virtual community of learning, in which are articulated common interests, objectives, action, dialogue, reflective speech and the contribution, resulting in implications for “learning” and “teaching”, it has a possible aiming for the practical teaching discussed by a virtual environment.

The discussions often happen based on histories that reveal elements of the teaching culture of the previously mentioned mathematic teachers. Such shared histories aim the continued formation of this community of practice, so the interaction in a community that possess the same interests, concerns, challenges and common obstacles becomes important. However, it is seen that such organization in educational environments does not occur for many reasons, among them, the lack of space and time. Therefore, we took a practice community formed by a technological dimension that used the virtual environment - TelEduc.

In this perspective, it is suitable to ask: Is it possible to build a community of practice in a computational environment in the process of continued education of mathematic teachers? How can the technology-based community of practice influence in the re-significance of the teachers practice of the participants of a community of mathematic teachers?

So, trying to formulate answers to these questions, we analyze the interactions, contributions and discussions that occurred between the mathematic teachers, students of the graduate program discipline: “Didactic Applied to Mathematics Teaching” at IGCE/UNESP/Rio Claro, using the Discussion Forum of the TelEduc environment, from a theory-based referential based in practice communities of (WENGER, 2001).

### **1. Discipline Presentation**

The graduate program discipline: “Didactic Applied to Mathematics Teaching” at IGCE/UNESP/Rio Claro, focused to allow the students: the sharing of conceptions on theoretic-methodological estimative that support the knowledge and the professional practice of the teacher inserted in a social and cultural context. The participants of this discipline constitute professionally as public and particular school teachers and public and private teachers of universities.

### **2. Discipline Methodology**

The discipline used the TelEduc environment as support to the live lessons, noticed that all the information referred to the lessons and to content to be seen was available in the environment. During the course, the students had experiences with “virtual lessons” (discussion in forums, chats, presentation of works, among others) and live lessons. The dynamics of the discipline consisted on the discussion and reflection on the suggested bibliography in the course and each student was oriented to synthesize the theoretical texts relating them with their pedagogical practices and discussion them in classroom and the environment’s Forum of Discussion. Later on, the students had been oriented to dispose these syntheses in the TelEduc’s individual portfolios and also comment and question the produced texts for the colleagues. Consequently, they have also answered the questions and comments in its proper portfolios by the others. These comments and

questionnaires were focused on the theoretic-methodological features of the teacher's professional development, under the didactics dimension and its multiple perspective in the research and teaching in Mathematical Education, approaching the dimension of the knowledge sharing in a context of communities of practice and its influences in the process of the education of mathematics teacher's, inserted in different cultural contexts.

On this, an investigation was made on the Discussion Forum, as a platform for sharing the problems and challenges of the teacher's pedagogical practice.

### **3. The TelEduc environment in the Continued Formation of Teachers**

It's known that the pedagogical possibilities of the use of Internet as educational tool are growing, every day a new feature appears to use the web as a resource to aid and enable new ways to conceive the educative process. In this context, there are new support environments to online education for the creation, participation and administration of web courses, such as the TelEduc platform. This environment was developed in a collaborative way, that is, all its tools had been idealized, projected and debugged according to necessities reported by users. From the constant use, it is being possible to verify some important characteristics for the development of this type of work: the easiness of use for people that aren't computer specialists, flexibility in the way the tools are being used and a set of functions that can be divided in three groups: coordination tools, communication tools and administration tools.

### **4. Communities of practice as history of shared learning**

This approach will be based on theoretic-methodological referential treated by Wenger (2001). This author approaches communities of practice in many contexts. In this paper we appeal to the communities of practice as histories of shared learning (WENGER, 2001). First, we approach some basic concepts on communities of practice and, in a second opportunity; we will present some aspects on communities of practice as histories of shared learning.

According to Wenger (2001), communities of practice are formed by people engaged in a process of collective learning in a shared domain, such as: a group of engineers working in similar problems, a group of students/teachers defining its identities in the school, a network of surgeons exploring new techniques. In this way, communities of practice are groups of people who share a concern, an objective or a passion for some action that they make and learn, through a constant interaction with the members of this community, as to constantly improve. This definition considers, but it does not assume, intentionally, that the learning can be the main reason a community to start, or still the learning can be the incidental result of the interaction between the members of the community. Nor everything that it is called a community is a community of practice. For the author, three characteristics are crucial for a community to be a community of practice: the domain, the community and the practice. These characteristics are presented by the author, on the following:

The domain: The community of practice possesses an identity defined by a shared domain of interests, subjects, thematic or knowledge. The members impose a commitment to the chosen domain and a shared ability that distinguishes them from other people. The members of a community of practice value their collective abilities and learn with each other, even though few people from their group value or even recognize these abilities.

The community: The members of the community involve themselves in group activities and discussions, looking for common interests in its domains, they help each other, they share information and they build relationships that enable a shared learning.

The practice: A community of practice is not mere a community of interests. Members of a community of practice are practitioners that mean they develop a history of shared researches, such as: experiences, histories, tools and ways to deal with recurrent problems. This process takes time and it also supports and keeps the interaction of the group.

According to this same author, online learning and thematic groups can also be called community of practice, since they have the three elements, considered above: a domain, a community and a practice. Communities develop its practice through many activities, such as: problem solving, request/exchange of information, experience sharing, reuse of resources, coordination and synergy, development of discussions, project documentation, visits, knowledge mapping and identification of gaps.

In this way, the concept of communities of practice has found a great number of practical applications. In the educational context the first applications for communities of practice have been education of teachers and formation of managers, which develop professional activities in the communities.

Related to the Web, the author points that the new technologies, such as Internet, have lead the reach of our interactions beyond the geographic limitations of the traditional communities. However, this fact does not eliminate the necessity of a community, but expands the possibilities of the communities and creates the necessity of new communities based on shared practice.

With these conceptions, we elucidate as Wenger (2001) presents the communities of practice as histories of shared learning.

According to the author, in communities of practice the negotiation of meanings is a complex process that takes time, because what defines the community of practice in a time dimension is the question of the mutual involvement and commitment, so that all members to share a significant and shared learning.

From this perspective, the author affirms that the communities of practice can be thought as histories of shared learning. Like this, "history" is not a mere personal question or a collective experience, but a combination of participation and reification, two ways of existence throughout the time, that interact even if located in different dimensions. For the author, our experience, our practice is in constant movement, always interacting with other practices and experiences, without merging to them.

The participation represents the action to assume a roll in something. This is in the relation with other people, in the communities of practice, that this process becomes evident. The participation is as personal as it is social and it's conceived as a complete process that combines the actions of making, speaking, thinking, feeling and belonging. In the participation, the person is revealed as a whole, the body, the mind, the social emotions and relations.

The reification is understood by the author as the conversion of something into a "thing", this "thing" can be understood as an idea, faculty, thoughts, etc., that is, generally speaking, somehow to express itself to the process who give shape to the experience, producing objects that mold this experience into something concrete. Therefore, this term comprehends and extends a range of processes that includes making, drawing, representing, nominating, codifying, describing, perceiving, interpreting, using, reusing,

deciphering and reorganizing. Soon, in all these cases, these processes will solidify into concrete forms of aspects of the human experience and practice and this is what gives the object status.

As about the reification, D'Ambrosio (1990) explains that:

*The reification is presented as "the mental activity in which is given a concrete form, simplified and labeled with words or other symbols, the vaguely perceived and relatively unreachable phenomenon such as complex object arrangements or activities". (p.30).*

With these perspectives, we are connected to our histories by means of the way as the artifacts are produced, preserved, resisted through time, reallocated and modified through the years, and also throughout our experience and participation, as well as how our identities are formed, inherited, rejected, blocked and transformed for the enrollment into the practice from generation for generation.

Wenger (2001) observes that the continuously acquired experiences are closely linked to the practices. Following this, the learning does not process itself in a context in which people simply must learn something, but engage themselves in the practice. Thus, are part of the process of enrollment the learning, participation and development of the practice. In this context,

*[...] practices are histories about enrollment, negotiation and development of shared repertoires, so, learning by practicing includes following the process of the involved community. However, caution must be taken not to say that anything that is done is learning. The significant learning involves practice dimensions such as: evolvment and mutual types of enrollment; agreement; development of shared repertoires, styles and speeches. This is what modifies our ability of enrollment in practice, of understanding on the reason why we are part of this practice. This type of learning is not merely a mental process, but it is related to the development of our practice and our ability to negotiate meanings. On this way, we create means of participation in practice in the contribution process to make this practice what it is. (WENGER, 2001, p.94)*

Therefore, for the author, practice is the sharing of learning histories that require an understanding for enrollment to occur. It is a social and interactive process, in which the people interact, make things together, negotiate new meanings and learn with each other. In the present article it becomes necessary to transpose these considerations for the context of technologies of information and communication.

#### **4.1) Communities of Practice Based on Technology**

How to use technology in a critical and conscientious way on the educational process, in order to propitiate compatible communities of practice with the current tendencies of the educative process and with the willing and necessities of the teachers and students?

Trying to answer, it becomes necessary to build some reflections about the important dimensions that surround the creation of communities based on practice in the technology. But what are communities of practice based on technology?

On literature, there are various terms referred to this theme, with differences in some theoretic-methodological aspects. So, there are authors who name these communities as “Scenarios Based on Objectives”.

We find in Jonassen & Land (2000) a paper of Kolodner & Guzdial, entitled “Theory and Practice of Case-Based Learning Aids”, in which the authors define “scenarios based on objectives” as being learning communities that locate students in a situation where they have to find some interesting objective that requires they research and learn everything related to the subject treated by the teacher. Thus, the students assume certain roles of real life and need to create strategies to deal with various thematic related to these papers. According to the authors above named the greatest difficulty when working with scenarios based on objectives is elaborating challenges that involve the students and guide them in the skills and contents that the teacher wants to treat on the given subject.

Concerning mathematical learning in a community of practice, Goos (2004) says that has fought and discussed with researchers/educators interested in creating environments inside classrooms that encourage cautious strategies of learning when engaging students in “collaborative forms of investigation”. In its article, was shown how such communities can be created in Mathematic classes. However, according to the author, there are proper concepts related to the learning derived from the participation of teachers and students in a community of practice. In this way,

*Conceptualizing the learning as an increasing participation in a community of practice raises two important questions: first, what kind of practice we desire the students to participate; and second, which specific actions would a teacher take [for the community of practice] to develop the participation of the students? (Goos, 2004:283).*

In the present article, we use these concepts relating them to communities of practice based on technology, with implicit objectives to the educative process. Another questioning is necessary, in this context: how to create and/or choose computational environments so that they became part of the community of practice? Its is believed that creation and/or choice of a computational environment must be linked to an educational philosophy in which we believe and claim, to an educational methodology and still to the objectives we want to reach in the development of subjects related to the different areas of knowledge (MISKULIN, 1999).

In this perspective, it is searched in literature, dimensions related to the choice of computational environment that can be used in the educative process, as well as support to presential teaching as to development of online education, composing the communities of practice. Therefore, it is reported to the project: “Star Schools: The New Millennium Improving Math and Science in Middle Schools”, developed by a team of researchers of the University of New Mexico - UNM, in the United States, which emphasizes, in one of its theoretical approaches, to create and develop communities of practice, aiming to learn, becoming necessary to reflect on the basic constituent elements of the learning process, that is, it is about comprehending how a dialectical relation can be established between these elements and the learning environment.

Following this, the researchers of the mentioned project defined a learning community as a place or a community specifically conceived with educational intentions based in ideas and concepts about knowledge,

objectifying to propitiate a social organization in the process of teaching/learning. In this perspective, in the project above mentioned, the effective communities of learning must be centered in the apprentice, rescuing its knowledge, abilities and beliefs; centered in the knowledge, becoming compatible with the cognitive development of the students; centered in the evaluative process, offering formative evaluation, which propitiates to the students opportunities on enrichment of its reasoning and learning and centered in the community, established throughout the apprentices, teachers and computational environments, with the objective to stimulate the shared knowledge and the collaborative learning.

Communities of practice are conceived based on technology, in this article as an educational context in which take part dimensions such as: computational environments for distance education and also computational environments that support presential teaching education, with its pedagogical and computational features; a educational proposal implicit, consistent with the objectives to be reached; the students and/or teachers and the mediation of the teacher in the educative process.

Like this, the constitution of a community of practice based in technology relates in various aspects, such as theoretic or methodological. However, one of the basic aspects consists of the interactive dimension of this community of practice based in technology, consisted of the TelEduc computational environment, with its pedagogical and computational features; for the students; by the mediation of the teacher and the educational proposal. Such interactivity allows various means of communication and contribution in the constitution of the shared knowledge.

## **5. Description and Analysis of the Students' Comments Available in the TelEduc Environment**

Discussion Forums were opened in the TelEduc aiming to propitiate a context in which the students/teachers and teachers/formers could interact in a participative way, creating a shared inventory of its practice, comprehended from the discussed thematic in the readings and the suggested reflections during the course.

From this, the participants of the discipline, supported by the TelEduc environment, exchanged messages whose content directly linked the subjects of its interests, thematic or the knowledge about the pedagogical practice, that is, it form naturally a common domain from problems, obstacles and reflections occurred in the pedagogic doing, the roll of them in its educational or research environments. So, the domain and the practice itself were present factors in the actions of this group that started to share their histories through group activities and discussions, looking for common interests in its domains, helping each other, sharing information and building relationships that allowed a shared learning. This way was formed a community of practice supported in technology, that is, a virtual community of practice.

Therefore, we present as follows one of the excerpts extracted from the interaction mediated by the TelEduc. Its analysis will be based on the characteristics of a virtual community of practice, conceived as histories of shared learning, presenting hints of a possible reassignment of the students/teachers pedagogical practice, participants of discipline of graduate program.

## 5.1 Discussion: What is to be a well prepared teacher?

*People, at the beginning of the text “Ways of academic profession and professionalism” the authors say about the study of Schaffel (1999), that according to them it brings interesting revelations regarding the “professionals” of the academics. One of the revelations is the importance that is given, by the interviewed, to the practice of teaching for which they consider themselves very well prepared. One of the reasons of this “well prepared” it’s attached to the severe election that they passed through passed to start the course of teaching. What you see as being important, currently, for the academic formation and what it is, for you, to be well prepared for such profession? (R.J., 31/08/2005)*

Another participant answers:

*I find it important to be well prepared. Our student realizes “clearly” when a teacher is insecure and doesn’t command the lesson, either didactically or psychologically. And to be well prepared for me is: to dominate the content to be taught; to know how to dialogue with the disciplined or undisciplined student (and this psychological part should be worked in the college); to be conscientious that is an opinion builder, of citizens who will be able to reflect and to find solutions for their day-by-day lives; and to be a researcher, therefore as Paulo Freire said “...we are unfinished beings...” (W.S., 02/09/2005)*

Therefore, we can say that in a community of practice (because of the three dimensions given by Wenger (2001) are found in this environment - domain, practice and community) supported in the technology (therefore such “meetings” happened in a virtual environment) while the environment allows a free choice for schedules (time) and places to participation (online interactivity) and reifying (description and reinterpretation of the academic practice by the discussions and reflections), favors the sharing of learning histories. In the same way, also favors the reflection on such learning histories and the elaboration of others that constitute themselves from the first ones.

Analyzing the presented excerpts, we understand that different questions emerge in the domain of a community of practice based in technology, formed for teachers of Mathematics, originally from various cultures. The implicit question of how prepared the teachers are and the explicit question of what it is to be well prepared to this position are questions of the domain of academic culture and that they are explained in the given virtual environment.

Following this, we believe that the reflection of the participants on these topics contributes for a re-significance of its pedagogical practice. At first, we realize it when the participant RJ, after reading the text of Schaffel (1999) that “being prepared for academics” consists from a severe election, allows it to question that statement, once that, when placing between quotations the expression “well prepared” became uncomfortable with this, therefore needs to know from the colleagues their contributions, opinions, positioning on this matter, that is, the histories, which for her maybe are important histories in shared learning. So, we realize that the community of practice based in technology has made a propitious environment of discussion and reflection of

questions related to culture teaching, as it shows one of the excerpts of one of the students/teachers, presented below:

*On Wenger's (2001) point of view the TelEduc environment, in our conception, characterizes itself as a community of practice because there is space, time and interest for the exchange and interpretation of the information, because the members have a shared understanding, deciding what is relevant and useful in a given moment, as well as mutual involvement and learning share. Our experience with TelEduc allows us to interact with colleagues through the discussion forums, chat and mail. With the portfolio we had the chance of sharing our ideas, wishes and solutions on the treated subjects. (M.F., 31/10/2005)*

## **6. Final Conclusions**

The article presented theoretic-methodological considerations about academic practice of graduate students, mathematic teachers, on a perspective of a virtual community of practice and their influences and possible re-significance of the pedagogical practice. Moreover, were investigated the pedagogical potentialities of the TelEduc environment, while used as a support platform to disciplines of the presented graduate program, and its influences and contributions in the constitution of a virtual community of practice that could allow the re-significance of the academic practices of the students/teachers, by means of shared histories.

Following this, this article offered theoretic-methodological subsidies for a possible understanding of the re-significance of the pedagogical practice of the involved teachers in a community of practice based in technology.

Ponte & Oliveira (2002) affirm that, from the analysis of the literatures we can assure that the communities supported by technology (virtual), as the community of practice presented in this article, have an increasing importance in various educative fields, especially for the initial and continuous education of teachers. These communities can be composed by teachers and students, characterizing itself in an environment in which is possible the sharing of ideas, information, materials, concepts, knowledge, etc. Therefore, the teachers start learning with other teachers and students, continuously updating their knowledge, developing and transforming the pedagogical practice. This happens, because until now, for the presential context, the performance in virtual learning environments makes that these teachers come across with a new modality of interaction and, therefore, with unknown questions that make them to rethink the roll that they play and its didactic-pedagogical performance.

Therefore, we believe that theoretic-methodological perspectives presented in this article had seek to outline ways for possible answers to the initial questions, that is, it was possible to constitute a community of practice in a computational environment, showing how the different cultures existent in schools managed to be rescued throughout online interaction on the process of continuous formation of mathematic teachers. This conclusion that emerged from the discussion and reflections shared in the virtual community of practice propitiated the re-significance of the pedagogical practice of the teachers/students, participants of this community.

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