Teachers of mathematics interchanging by a social network: do they comprehend among them?

Natalia Fátima Sgreccia

Facultad de Ciencias Exactas, Ingeniería y Agrimensura, Universidad Nacional de Rosario (UNR), Santa Fe, Argentina. E-mail: <nataliasgreccia@gmail.com>.

Pablo Fabián Carranza

Instituto de Investigación en Enseñanza de las Ciencias Naturales y la Matemática, Universidad Nacional de Río Negro (UNRN), Río Negro, Argentina. E-mail: <pfcarranza@gmail.com>.

Abstract

This paper is framed in a triennial project in the area of Information and Communication Technologies (ICT) in Mathematics Education. We constituted part of a group of university teachers who engaged in a kind of training teachers in service. In particular we were interested on the use of ICT in two senses: as a means of communication (Facebook) and as a teaching tool (GeoGebra). The work consisted on constructing a process of accompaniment to teachers of Mathematics at middle schools of four localities of Argentinean Patagonia. They were distributed in two groups of two schools each one. One group treated contents of algebra y the other one of functions. The process was to co-generate didactical cycles of three phases: priori analysis, commissioning classroom and posteriori analysis. In this presentation we pay attention to some aspects of the communicational use of the ICT which were made in the algebra group, with special focus in the produced levels of confidence and autonomy.
Keywords: Virtual communication. Training teachers in service. Model of accompaniment.

1 Introduction

In this paper, we share some experiences within the frame of a project about the use of Information and Communication Technologies (ICT) for teaching Mathematics in high school. Here, we analyze some data after one year and a half of work with groups of teachers and researchers. A unique aspect of the project is the use of ICT in two directions: as a teaching tool and as a means of communication. For the former, we have particularly focused on the software GeoGebra (dynamic mathematics software for all levels of education that brings together geometry, algebra, spreadsheets, graphing, statistics and calculus in one easy-to-use package). For the latter, our attention is focused on the possibility of workgroups by virtual communication. In this respect, we address some aspects of the communication between the members of the project.

2 The use of ict as a communication tool

Four secondary schools in the Province of Río Negro (Argentinean Patagonia) were invited to participate in the project. Three of them are located in a rural zone of plateau (Ministro Ramos Mexía, Sierra Colorada, and El Cuy) and the other one, in an urban zone (Allen). The distance between them is 400 km, in some cases. In

this context, an electronic communication mechanism was justified. Therefore, a virtual means was proposed to promote interaction without the need for physical presence. Thus, we did not start with a model; we started with the characteristics of the context; in other words, the context configured our proposal.

At beginning, we proposed the use of the Moodle platform, but then, because of two reasons, the groups shifted to a social medium (Facebook). The first reason was the lack of infrastructure in the localities, and the second was the problems of the Moodle platform architecture. The localities where most of the schools are located do not have appropriate Internet connection (neither in the teachers' households nor at community institutions). These localities have between 500 and 1.500 inhabitants, and in some cases, there are no telephone networks. A Moodle platform requires a relatively suitable Internet connection. Most of the localities did not satisfy these technical requirements, hence many teachers could not communicate with their colleagues.

As for the second reason, the Moodle platform architecture has a classical organization, with an area where teachers provide material to their students and an area for evaluations, for example. The initial promoted relationship is a vertical one, where a teacher has more management rights than students and the teacher is the one who determinates the material and the tasks to be done. The underlying links are distant from the one proposed in our Project; the changes and concessions would be too costly. Finally, the groups moved to a cheaper platform in terms of requirements of connection and with a more horizontal relationship between the members. We agreed to establish communication through a social medium, such as Facebook, with relatively good functioning in rural localities.

We agree with Castells (1996) as regards the exponential growth of interactive computer networks. They create new forms and channels of communication, and "shape life while it shapes them" (CASTELLS, 1996, p. 28).

By virtual reality, this author means one that is transmitted, expressed or communicated through a system in which reality itself is trapped, captured, transformed into images or signs and, once communicated, becomes another reality and another experience to those who consume or receive it. In this communication system, the space sheds its geographical and historical roots and is part of a collage of images that replaces the space formed by specific locations. Time is cleared in this system: past, present and future merge in a timeless process.

2.1 Relational model with teachers

In our proposal, the researchers try to establish a horizontal relationship with teachers where the former do not take the role of experts nor do the latter take the role of students. Instead, in our proposal, the researchers assist the teachers, and they are main makers of their own development. The researcher promotes the teachers achievement, on the one hand, autonomy respect the researcher and, on the other hand, cohesion with their colleges. We understand that if an evolution of the practices is possible, it is because of collective (nor individual) actions. The researcher only indicates what he sees as correct or not, what he considers appropriate or not, and this is done because of three interrelated reasons: ethical principles of respect for the teacher's professionalism; lack of knowledge of the specific aspects of the institution where each teacher works (as factors that make the teachers the most suitable people to decide about modes of interaction with their students); our interest that the teachers develop their own collective pedagogical projects.

In this sense, we understand that "reality" is not an objective fact, shared by all; it is a subjective construction of each individual person. Thus, we admit that a researcher and a teacher may have different opinions based on their different perceptions, both of them perfectly valid ones.

In the frame of a subjectivity of interpretations, our position can be described as one where the researcher is a facilitator of teachers' collective development. In this sense, and paradoxically, we admit that attempting this type of relationship could be a contradiction itself. Indeed, regarding the perception about how practices can evolve, teachers could not share our position and wait or desire another relationship (as for example the habitual one, based on the roles of expert and student). Precisely, our presentation intents to approach the possibilities of this type of relationship, which we call horizontal or accompaniment, in a context where this kind of connection is neither habitual nor promoted.

One of the possible contradictions of our proposal is that we meant to promote a relationship probably neither expected nor desired, *a priori*, by the teachers. Another possible contradiction is the dynamic of the project. Indeed, if in the frame of keeping track of the teachers' development, the proposal of a particular type of relationship can be considered as a contradiction of the concept of accompaniment. Thus, it could also be the idea to suggest a type of work dynamic, as in our case, the pedagogical cycles.

2.2 Pedagogical cycles

The teachers, in two groups, were convened to carrying out together at least a pedagogical cycle. Each group was accompanied by researchers who we call coordinators. The cycle comprises three phases, as can be seen in Figure 1.

Figure 1. Pedagogical cycle
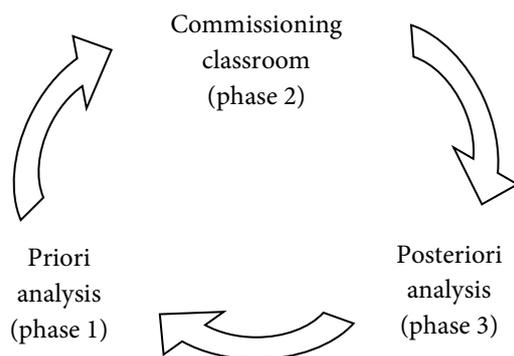
- *Priori analysis*. Used to agree on the problem to be worked with in class using GeoGebra, to resolve the problem, to characterize the concepts required to solve it, the difficulties and potentialities of their students, and to analyze possible teaching interventions.
- *Commissioning classroom*. The teachers bring the problem over to the classroom, audio and written registers are made, the class is shared among various teachers - but in our case that was difficult to accomplish because of the small number of teachers at the school.
- *Posteriori analysis*. To collate and reflect about the eventual differences between the plan in phase 1 and what actually happened in phase 2. It contributes to the work of members at two levels: pedagogy and workgroup.

2.3 The moments of accompaniment

The relational model of accompaniment is not new; it is related to another model known as action research. It is not easy to differentiate them in their principles, but they do not coincide as far as teachers are concerned. We could say that in the accompaniment model, the researcher pretends to be present but always with the intention to leave. His interest lies in the promotion and consolidation of groups working autonomously without his own presence.

The role of the researcher is permanently unstable, his actions and interventions always try to be limited and short-lasting over time, so that teachers assume their roles as protagonists, as well as design and bring forward their own proposals.

In this context, the aim of the researcher is for the group to operate with autonomy, without directives or guidelines from him. This makes the researcher continually seek not to take on roles of leadership or central ones, given that the concept of leadership is questioned in this model. The idea that somebody leads others is not necessarily positive in the relational model.

Researchers who study the relational model of accompaniment include authors such as Beauvais (2006). She mentions three moments in an intervention of this type:

- *Comprehension*. It is particularly strong in the first stage, at the moment of constitution of roles, and will stay present for the rest of the time. It involves the comprehension of the other; comprehension of his cultural and contextual conditionings, his history and his own projects, while always leaving room for incomprehension. This was meant for assuring the privacy of the other and of oneself - privacy that promotes reciprocal freedom between the different actors.
- *Action*. The researcher (coordinator) follows the teachers' work dynamic but he resists the temptations of saying and doing on their behalf. It is a central moment, trying to help a group of people to constitute, to route and to reach their own objectives. We understand that our proposal presents a contradiction with the model. Indeed, if accompaniment is a type of dynamic with and for the teachers, the fact that the coordinators propose to teachers a type of work characterized by pedagogical cycles could be interpreted as a

contradiction itself. In our case, we assume this contradiction with the risks it could imply, including the failure of the proposal.

- *Reserve*. This model seeks autonomization; in our case, that of a group of teachers. By autonomization, we understand a position of appropriation of the objectives of the project, generation of its own objectives and the possibility of proposing actions and implementing them by initiative from oneself and the group. This appropriation can be produced if the coordinator does not take on the role of holder of knowledge and allows teachers to be protagonists.

These three moments that characterize a relationship of accompaniment are not a sufficient condition but they are necessary for accomplishing it. This type of proposal where teachers take the initiative out of actions is neither evident nor immediate. In this report, we focus on how the first moment (comprehension) was developed, where the relationship between the members of the group started to build up, bearing in mind that this relationship wants teachers to be protagonist and autonomous. Also, we understand that this proposal is not habitual in in-service teacher training and it could become complex in a relational environment, such as the one of this project, where most communications are produced virtually.

Basically, in this paper, we focus on analyzing how these groups advance towards the comprehension of the other - the first moment, according to Beauvais (2006) - in a context where the interchanges are mostly virtual ones - in particular, by means of a social medium.

3 Method

The research has a qualitative approach of virtual ethnography. That is, internet-based ethnography, which studies the mediated interactions by ICT through a concrete experience of a virtual community (HINE, 2004).

The study is based on two types of data: the interchanges produced on Facebook by the teachers and the coordinators, and the audio recordings of interviews with the teachers and the principals of the schools. These different data are interrelated in two directions: the conclusions of one type of data will be confirmed by the other one, and one type of data brings clues for the search of con-

clusions by the other one. Individual and group interviews were conducted. They were semi-structured with two or three issues on the agenda.

Two groups were conformed for making pedagogical cycles using GeoGebra, one about algebra and the other one about functions. Each group worked in two modalities: in person, with two annual meetings, and virtually, through a social medium known by the members. Here, the data come from the conversations from within the group, by the second modality.

In particular, in this paper we analyze some phenomena in the algebra group. It was formed by Mathematics teachers from two localities (El Cuy and Sierra Colorada). They were selected because of the reduced possibilities of the teachers to develop activities within the frame of in-service training. There are too few in one single school (to interchange their experiences) and they are too far from cities with some kind of offer in this sense (by on-site classes).

The group was comprised of five teachers ($T_1 \ldots T_5$), who were coordinated by four researchers ($R_1 \ldots R_4$). Some of the coordinators lived more than 700 km away from these localities.

There were 36 interchanges produced in the group, and they include 164 interventions. An intervention represents all expression in a written manner and an interchange is a set of interventions which is contained on the same post on Facebook.

We understand that "every narrative is defined by the space-time structure of the facts and the position of the narrator and the receiver in that space and time" (MONTIEL, 2009, p. 160). Moreover, in this case, we consider that the text becomes the primary means of the non-on-site interchange for the creation of meaning that, being shared, becomes the essential means to build communities as there is agreement on common purposes (HERRING, 1996).

4 Results

We include three central aspects about our findings: the combination between the virtual and on-site times, the process of autonomatization and the comprehension of the other (person, school, and context).

- *About the virtual and on-site times*. By practically, every interchange produced by a manner without face to face interaction is called

a virtual interchange. These interchanges included the use of one social medium but also of others, e.g., Skype and e-mail. While all of these tools were promoted by the co-ordinators, the only one used by the group was Facebook. The virtual meetings were contrasting in various aspects compared with the on-site ones. The on-site meetings were strongly required by the teachers, despite the big distances they have to travel to attend them, and the fact that they have to make family and job arrangements. However, the teachers demanded more on-site meetings than the two initially provided.

At the beginning, we expected the dialogues to be progressively canalized by virtual means. But only incipient interchanges about pedagogical work were generated in the social medium. The more intensive discussions and analysis were produced in the on-site meetings, where the teachers participated and quickly advanced significantly and enthusiastically. The advances in the virtual dialogues were at a germinal level, not in a constant or a homogeneous manner among the members. For example, a teacher has the initiative to propose a pedagogical reflection and then a colleague intervenes by asking for a supposed on-site meeting. In other words, a teacher began a discussion in a virtual environment and it was suspended when another teacher introduced the on-site meeting issue.

(T_1) I was working at the last week of classes, with GeoGebra, doing a presentation to the pupils of the second and third years. They liked it very much working, at first with geometry… I left the concern to explore the software on the holidays… a good beginning ☺
(R_1) What a good new "T_1"!! Thank you for sharing it!! More so, we have to meet so you tell us about your experience in more detail… a very good beginning ☺
(R_2) We should think about a convenient time to talk on Skype and share the experience or "T_1". It is pending for us to organize when we resume our activities. What do you think??
(T_1) It's an excellent idea…
(T_4) Yes, it is a good idea.
(T_3) Ok.

However, sometimes the teachers' pedagogical proposals were resumed by their colleagues, thus giving continuity to the discussion. In one of these cases, a coordinator interrupted the dynamic and proposed to continue the analysis in an imminent on-site meeting.

(T_2) Hi everybody, as I have a creativity low day, I searched for an algebra activity on the Web for resolution in the classroom with GeoGebra, and I found one about equation systems that actually seems very simple. The proposal is to resolve an equation system by the graphical method. At first, I found the values of X and Y by someone of the methods (equalization, substitution, etc.) and I introduced them. I introduced the equations and I found a result. At the graphic the lines joined at the point 1, being X = -1 and Y = 5. I don't know if there is another manner to resolve the systems with GeoGebra by the graphical method. I've uploaded the file with the proposal and you can say what you think about it, and if we could take this proposal to the classroom, or another one that you can suggest. Kisses.
(T_3) I will put it into practice now and I'll see what else emerges.
(T_1) I will practice it to see how I will and then I'll take it to the classroom. I still have to develop a unit to get equations… It is an interesting proposal.
(T_4) I'll see what I can do.
(T_2) There's no hurry to get it to the classroom. At first we should analyze the activity and see what other proposals emerge. When we get the topic to the classroom, we can apply it. What do you think?
(R_3) Yes, I agree with what "T_2" is saying. The idea, I think, we can discuss it in detail when we meet on May 10th in Upper Valley.
(T_1) Ok… I think it's a very good idea… thanks.

Due to the weak state of confidence, it could be supposed that any fact would interrupt the dialogue. Also, the inexperience of the coordinators might have had an influence, as they looked strictly at the model without accepting that it is gradually built by reality.

- *About the autonomization*. By autonomy, we do not understand lonely, individual work; on the contrary, we aim for the teachers to form work teams. These teams avail common points but different ones, too. Autonomy is referred to the relationship with the coordinators. Indeed, in the frame of an accompaniment, we wished that the teachers could propose their own tasks, their own ideas and, based on the analysis of them, everyone could evolve in their knowledge -

both teachers and coordinators. The members of the Project were conscious of this newness. But the lack of references from previous trainings caused some stagnation in the way of autonomization.

However, there were strong indications of adhesion to the proposal of autonomous work. For example, a group of teachers of a school, out of their own initiative, proposed to present the Project as an institutional project in order to involve the rest of the teachers of the school.

> (R_1) Here, I'm sending the first summary of the meeting on May 10th about what happened, the agreements, the future actions. Please, you can revise, expand, modify…
> (T_3) I'd add that we'll not only try to present it as an Institutional Educational Project, but also raise awareness at the Institution that it is a GROUP Project, not individual training.
> (R_2) Hi team!!! With the details of "T_3" I can see how fruitful the working day was … it' so good!! What "T_3" proposes is interesting to form work and reflection groups, concerned about the teaching of mathematics, in particular with algebra approach.

We understand autonomization as a process, a kind of link or contract that, beyond its enunciation, must be built. It is a process, a non linear progression, with advances and setbacks. This process requires time and stability at work too. The stability at work is not evident at the current educational system of the Province of Río Negro because there are many precarious charges (because the teachers do not have a teaching certificate or the lack of public admission contests for consolidating the teacher in his workplace). Despite this fact, the lack of references from previous experiences and the short time that the project lasted (one and a half of collective work), the teachers showed signs of adherence to the model of autonomy work and a genuine progress in this direction.

> (T_1) Hi people, how are you? I'm sharing some activities I performed with the pupils of the second and third years…
> (T_3) Hi "T_1"! It's so good to continue working on the Project. Regards.
> (T_1) Still in the running…
> (R_2) Hi group!! What do you say if we look at the file shared by "T_1" and do some interchanges, even if by this virtual means? Don't leave "T_1"

alone!!! Who breaks the ice? A very big regards on Teacher's Day.
> (T_1) Yes, yes… don't leave me alone!!! ☺

When we say "work in autonomy", it is about teachers-coordinators but not among peers (teachers-teachers). I understand this kind of work is strongly related to the construction of comprehension of the other.

◆ *About comprehension of the other.* We understand that comprehension of the other is not an attitude of judgment or evaluation of the other. In contrast, it is a look at the other that allows to understand him as a result of the circumstances surrounding him, a result of his history lived and nor lived. The consolidation of the comprehension of the other is based on knowledge of the other. For that purpose, in order to know his strengths and weaknesses, it is necessary to build confidence, to express doubt or fear of the unknown without feeling the pressure of being judged or evaluated by their peers.

In this sense, we observed important advances, more evident at the on-site meetings. However, they also happened in the virtual environment.

> (T_2) Another recommended activity is the polynomial division by Ruffini, but I have not tried it yet, so I don't have any idea how to do it with GeoGebra. If someone wants to try it and tell us the steps, it would be great. Kisses!!!!
> (T_3) And now what!!!!! What do we do?....
> (T_2) To experiment with ICT… something will happen ☺

These advances were produced although there were various factors to disadvantage, for example: instability of teachers' job position; lack of reference of previous similar works; geographical dispersion of the members; lack of knowledge of the context of teachers' working conditions. Indeed, some coordinators lived in localities more than 1000 km away from the southernmost schools. This distance is not only geographical but also cultural, i.e., urban and rural contexts. However, the coordinators and the teachers tried to be sympathetic to one another. For example, the questions of a coordinator to a teacher may apparently sound trivial, but they are basically meant to gather further information on the technological work conditions of the teacher and encourage

a pedagogical discussion about the incidence of these issues in classroom activities.

(T_1) Hi people… I'm sharing with you, in writing, the activity I did with the pupils of the third year… DISCOVERING GEOGEBRA…

(T_4) Great.

(R) "T_1" how good!!! We should agree on a convenient time to share these nice experiences on Skype. We can think of possible times for next week, taking into account "T_1"'s suggestion. Kisses.

(T_1) The 15th sounds good… Who is free?? Who wants to join in??

(T_2) Great, this way, students can stop feeling uncomfortable with the software.

(T_1) It's interesting to see the reaction of the pupils, and how interested they are…

(R_1) Thanks "T_1" for sharing the activity, and congratulations!! Have all the pupils of the school got netbooks, or only those from the third year? And I agree with you that precisely the rich is to recover their interest! When can we continue?

(T_1) From the first to the fifth year, all the students have netbooks, which makes our work easier… Today I told a colleague that various pupils asked me: "when will we start working with GeoGebra?"… "Coming son"… I'm finishing with the topic equations…

(R_1) Of course it makes things a lot easier! Who asked you, "T_1"?, was it the same group of students or another one? How many pupils are in the third year?, are they few? Because without projector is all a theme, or not?

(T_1) There are 13 pupils in the third year … There are many students who asked… Someone from the third, of second or first years, as I work with the three grades… without projector is all a theme, yes… but the positive side is that everybody has a netbook and that there are few of them, so I propose the activity and walk around pupil by pupil and help them…

(R_1) I understand, of course, and I suppose you work in the classroom, or have you got a computer room? Is there someone responsible for the computers, for example a technician, who could help you in this work of helping the students? And if you think of working with the three grades, we have to collaborate as a team in some of these organizations, what do you think? I'm more and more ehthusiastic…

(T_1) We do the work at the classroom… The person responsible for the netbooks is busy with other tasks, so I do it alone… Gladly, I would love it if we all worked on it… I'm also enjoying it, this is because I told the students "we've

stepped on the accelerator"… And now that we are working and finishing the topic equations, I will explain how to resolve an equation in the spreadsheet of GeoGebra…

(R_1) Go ahead, could we engage in this proposal that involves our topic of the Algebra Group?? (Or tell us if you have another one.) Can you tell us your idea? (You can share it on a MS Word file if you like, since you uploaded another one before). We should think about and discuss a possible activity which perhaps we can help the children to do it… And we can set up a meeting on Skype for everyone to attend!

(T_1) Ok… As soon as I have written it I'll upload it…

(R_2) How good of you, "T_1", to share your enthusiasm!!! We have to step on the accelerator and go forward. Share what you are thinking with the group and we can come up with ideas. Before the end of the month, we should connect on Skype. What's your time availbility next week?

(R_1) Hi! How are you? Answering "R_2"'s question, are you free on Thursday or Friday? Can we meet for an hour? And "T_1": how do the equations treat you, do you want us to think together? Can you give us examples of some ones you are doing by pen and paper? Kisses to everybody!!

(T_1) On Thursday… ok, what time could be the rest??... On Wednesday I upload some examples, by now I'm discovering and amazing myself ☺

In the next section, we present some conclusions; others are in recent publications of the authors (SGRECCIA, CARRANZA, 2014a; 2014b).

5 Conclusions

Teachers' autonomization regarding the coordinators requires the comprehension of the other. The particular aspect of the construction of the comprehension of the other, in our case, is that it would mostly be produced through interchanges in a virtual environment. Many teachers had communication experiences in virtual environments. Many of them used social media for communicating with kin and friends. However, in these cases, comprehension preceded virtual communication. Indeed, the link with kin and friends was built and the virtual interchanges allowed them to keep or refund it. In our Project, the relationship was reversed. The members had to build the comprehension of the other mostly by communicating virtually. That is, it is indispensable to create the necessary conditions for collaborative work (AIMI; PAGNOSSIN, 2012).

We do not support the idea that this objective is impossible to achieve. However, we see, on the one hand, that projects need to be longer in time and, on the other hand, their evolution has to be underpinned by on-site meetings. The on-site meetings were strongly demanded by the teachers, and if we could not provide them, it was for financial constraints of the project. But we saw this demand as a legitimate one and, because the colleagues insisted in "looking at each other", we understand that on-site meetings allowed to build links that the virtual environment could not, at least in the reduced times of the Project.

The lack of comprehension of the other does not allow to advance in this type of proposals. Indeed, the advances were weak ones because the teachers and the coordinators avoided the discussion, as they thought it would lead to conflict rather than to debate. We understand it happens because a relationship of trust was not consolidated enough for addressing discussions without the risk of turning them into conflictive situations.

The lack of comprehension also blocks the dialogue from the point of view of the, of equality. We understand that in order to discuss collectively, one has to consider oneself at a high level of parity with the others. In this respect, the teachers of rural zones said to feel they have less prestige compared with the teachers who work in urban zones. There is prejudice to overcome, based on the assumption that teachers working in an urban center have better tools and knowledge that those working in a rural environment. Mutual comprehension is aimed at eradicating this prejudice and other types of prejudice, in order to enable the construction of a parity relationship and, thus, allow a horizontal debate with all the members of the group. Some kind of sensibility is needed (BEAUVAIS; RAY, 2012).

The lack of construction of comprehension of the other in a virtual environment is a possible interpretation for the difficulties, but it is not the only one. Indeed, collective work is a fundamental condition in our proposal – it is not a habitual feature in the Argentinean secondary school system. The usual one, unfortunately, is the lonely work of teachers, who interchange with their peers at very limited times (at playtimes, at the staffroom or, sporadically, at monthly / trimonthly / annual meetings), when they report progress in the syllabus and class schedule, describe their groups of pupils or inform general news. And this is mainly due to the characteristics of the current educational system, where teachers' work is strongly atomized in institutional terms. According to Lessard, Kamanzi and Larochelle (2009), the role of the school directives is crucial for the sustainability of this type of non-individual work.

The consequence of work atomization is the lack of habits, links and organization for collective work between teachers and this, we insist, occurs in the material reality. This certainly led us to question whether it is actually possible to build habits, links and an organization in a virtual environment when, in general, teachers do not have the experience of having built it in a material space.

We do not doubt that the challenge of constructing it in a virtual plane would be as or more difficult than doing so on a material plane. And this mainly due to one reason, at least.

We understand that the group has not achieved to build its own time space relation with the virtual reality (CASTELLS, 1996). It could have enhanced the communication flow as sequences of interchange and interaction.

Indeed, the narrative models and the representation that the virtual reality promotes and/or allows were not sufficient for consolidating the integration between the teachers and the coordinators, at least in the period of the Project.

We can say that virtual reality and material reality remain relatively parallel with little intersection points. We do not observe that both realities interchange in an intensive manner, and neither does the one produced in the virtual reality allows an evolution of the produced in the material reality of the classroom.

We rescue this type of experiences from a broader perspective of human interaction, which involves mutual expectations and the need to share, in means that shift from circumstantial and limited to continuous and unlimited ones (FUNES, 2008).

Also, we understand that comprehension is a fundamental pillar for this type of proposals and we think it is necessary to keep on the direction of the relationships of accompaniment in projects with teachers. For that purpose, we believe that the training proposals have to consider the context where they will be implemented and, also, the time of construction of the new links

has to be deemed as important, more important that the one provided in this Project. And it is not only for the teachers but also for the coordinators, where the main reference, albeit implicit, remains on traditional training. As stated by Gros (2008), the digital society demands the network, the participation, the collaboration and the virtual communication as good supports for the learning and professional development, but a considerable way has yet to be transited.

Attending to the vacancy announced by Hine (2004) about research studies on the uses of the Internet, we believe that we have contributed to the investigation on how a social medium was used by a group of Mathematics teachers in a particular context. We agree with Mantovani (1994) that it is difficult to sustain that technology has social effects regardless of the context in which it is used.

Finally, we emphasize, as Jerónimo (2009) and Santos (2015) do, that becomes relevant the need to train university teachers/researchers (who we called "coordinators" in our framework) in this new educational aspect of the analysis of the virtual speech, which can contribute to construct a "presence" tutoring based on electronic speech, an accompaniment forward the comprehension among teachers.

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Profesores de matemáticas interactuando en una red social: ¿se comprehenden entre sí?

Resumen

El presente artículo forma parte de un Proyecto de investigación trienal en el área de Tecnologías de la Información y la Comunicación (TIC) en Educación Matemática. Somos parte de un grupo de profesores universitarios que están involucrados en un tipo de formación continua de profesores. En particular nos interesa el uso de las TIC en dos sentidos: como medio de comunicación (Facebook) y como herramienta didáctica (GeoGebra). Nuestro trabajo consistió en desarrollar un proceso de acompañamiento de profesores de Matemáticas que trabajan en escuelas secundarias de cuatro local-idades de la Patagonia Argentina, que fueron separados en dos grupos de dos escuelas cada uno, uno dedicado al tratamiento del álgebra y otro al de las funciones. El proceso consistió en la elaboración conjunta de ciclos didácticos que comprendieron tres fases: de análisis a priori, de puesta en aula y de análisis a posteriori. En esta presentación observamos algunos aspectos del uso comunicacional de las TIC que realizaron los profesores del grupo álgebra, deteniéndonos en analizar los niveles de confianza y autonomía producidos.

Palabras clave: Comunicación virtual. Formación continua de profesores. Modelo de acompañamiento.