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MEDIATIONAL TOOLS FROM MENTORS ACTING AS RESEARCH SUPERVISORS IN ONLINE EDUCATION

FERRAMENTAS MEDIACIONAIS DE TUTORES AGINDO COMO ORIENTARORES NA EDUCAÇÃO ONLINE

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ABSTRACT

Supervisor's role and function represent an increasing field of interest and study, especially due to their substantial responsibility in the development of research. However, little is known about how supervisors develop their work and how they could have been trained or assisted to improve their supervisory practices from a theoretical point of view. The aim of this study was to identify and analyze the mediational tools adopted by tutors in a supervisory activity system (SAS) from online education. To produce a quantitative and qualitative analysis we created 16 categories pointing to mediational tools, which lead to a total of 393 references in the entire data. The mediational tools in this SAS allowed us to identify some tensions and contradictions: 1) writing was a tension between tutors and students but also served as a register of the supervisory process and a way to promote writing during it; 2) the collective orientation proposed by the course coordination was successful in creating a community of practice for the tutors but was not effective within every group of students from each supervisor. Based on this

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analysis and the tutor's words, these tensions may represent possibilities of expansion to the SAS from the online to the onsite context.

Keywords: activity theory; meditational tools; mentor; supervisor.

RESUMO

O papel e a função do orientador representam um campo crescente de interesse e estudo, especialmente devido à sua substancial responsabilidade no desenvolvimento da investigação. No entanto, pouco se sabe sobre como os orientadores desenvolvem seu trabalho e como poderiam ter sido formados ou auxiliados para melhorar as suas práticas de orientação do ponto de vista teórico. O objetivo deste estudo foi identificar e analisar as ferramentas mediacionais adotadas pelos tutores em um sistema de atividades de orientação (SAO) de educação online. Para produzir uma análise quantitativa e qualitativa criamos 16 categorias apontando para ferramentas mediacionais, que levam a um total de 393 referências no conjunto dos dados. As ferramentas mediacionais neste SAO permitiram-nos identificar algumas tensões e contradições: 1) a escrita era uma tensão entre tutores e estudantes, mas também servia como registo do processo de orientação e forma de promovê-la durante o processo; 2) a orientação coletiva proposta pela coordenação do curso teve sucesso na criação de uma comunidade de prática para os tutores, mas não foi eficaz em todos os grupos de estudantes de cada orientador. Com base nesta análise e nos depoimentos dos tutores, essas tensões podem representar possibilidades de expansão para o SAO do contexto online para o presencial.

Palavras-chave: ferramentas mediacionais, orientador, teoria da atividade, tutor.

INTRODUCTION

Academic research is one of the key elements of quality in higher education. The existence and relevance of an institution's research sets universities apart by determining their prestige and recognition. In addition to the fundamental importance in the production of qualified and original knowledge, research contributes to the quality of teaching as research teachers are better able to bring students updated and meaningful knowledge to society. Nevertheless, few institutions invest in systematic research training (MANATHUNGA, 2005).

Regardless of the researcher's level of education - whether an undergraduate student or a researcher professor - it remains implicit that the research process will be learned intuitively or by imitation of a mentor. Although this process has been taking place for a long time, new productivity pressures on researchers, reducing research time and leading to hybrid and collective models of orientation, increasingly highlight the limits of that spontaneity (MCCALLIN, NAYAR, 2012; BASTALICH, 2015; MAOR, ENSOR, FRASER, 2016; BIANCHETTI, QUARTIERO, 2010). Extreme cases of abuse and even murder or suicide have gained increasing visibility (LEE, 1998; ZHAO et al., 2007). In that context, there is a growing concern to educate students and researchers on the ethical aspects of the supervisory relationship, the definition of authorship and the conduct of research (YAHAGHI, H.; SOROOSHIAN, S.; YAHAGHI, 2016; BOWDEN, JA; GREEN, P., 2014; WRIGHT, 2017).

Such context points to the main problems of research supervision: the lack of training and discussion about the mentor's role and performance and the centrality and isolation of the relationship between the mentor and the student under her/his supervision. The obscurity of these topics at the university is also attested by the tiny amount of research on mentor training. In the international context, some literature reviews confirm this small volume of publications (MCCALLIN, NAYAR, 2012; GRANT, HACKNEY, EDGAR, 2014; BASTALICJ, 2015; MAOR, ENSOR, FRASER, 2016; MASSI; GIORDAN, 2017).

Grant, Hackney, and Edgar (2014) discuss an “agreed” conceptual view of good mentoring practices from a literature review and data from questionnaires and interviews. They review documents from Europe and Australia that institutionally guide research practices. From the comparison between these documents and what their interviewees commented on the research work, they defined three metaphors for mentoring: 1) the machine, totally attached to the rules imposed by official documents; 2) the coach, who seeks to guide the student's work as a sports coach; 3) the journey, in which the supervisor sees himself as the student's travel partner.

Bastalich (2015) has selected articles published in the UK, Australia, Switzerland, and the Netherlands over the past 20 years on what is considered one of the main problems of mentoring: the relationship between the mentor and the one under supervision. She identified four conceptual frameworks that define what would constitute “good guidance” with implicit relationships between mentors, doctoral candidates, academic developers and the government. The author confirms there is an isolation in the relationship between mentor and student mentored and she points to the negative consequences of it. At the same time, she argues against a decontextualization and operationalization of that relationship. For Bastalich (2015), the pedagogical and psychological aspects of it as well as the learning that supervisors could acquire from narratives and experiences of their peers would be fruitful to improve the current scenario.

McCallin and Nayar (2012) specifically analyzed the supervision of postgraduate researches in New Zealand. Regarding the context of the study, the authors emphasized the concern to increase the postgraduate completion rate, respecting and reducing the research time, as contradictory to the working conditions of the supervisors. They need to supervise more and more students, without an expansion of the teaching staff, and to face a fierce competition for research resources. Added to this, there is a growing concern with the internationalization of research and with the guidance of foreign students. Supervision is currently developed according to the mentor's preferences, who might choose a hands-off model, in which the student organizes his or her own research, or hands-on, which is more structured by the mentor and tends to be completed faster. In addition to these, they present three general models: 1) traditional, which involves a dyadic relationship between supervisor and student; 2) group supervision, involving the relationships between the supervisor and the student and the students with each other; 3) mixed, which has new communication technologies embedded into the mentioned models. Finally, the authors discuss two strategies for improving mentoring practices: 1) to develop the supervisors' research skills in a changing context; 2) to implement training

programs for students to enrich their supervision, involving literature review, research ethics etc.

We also conducted a comprehensive international review of 237 articles that allowed us to identify ten thematic categories on supervisor training: the ethics of research and supervision; scientific writing and supervision related speeches; gender and multiculturalism; the pedagogy of supervision and professional development of mentors; collective supervision; supervisory models; perceptions, experiences, expectations or conceptions of students and supervisors; relationship and (dis)agreement between supervisor and students; productivity and academic performance; technologies in supervision (MASSI; GIORDAN, 2017). The survey highlighted the scope of the theme and some recent trends in the literature such as new models of supervision, concerns with ethics, the pedagogy of supervision and professional development.

McCallin and Nayar (2012) highlight the fundamental role of the supervisor-student relationship and they indicate the importance of a specific training for the mentor to be able to promote the success of the student. They discuss the pedagogy of supervision, recognizing that there are different conceptions about it and they also indicate that in the last decade some authors have recognized the importance of the supervisor's role, leading them to support their training. They justify it by considering that supervision is a specific type of "teaching", with its own specificities and functions. The authors also emphasize that the training is fundamental to advance the exclusively methodological formative discussions and they recognize that the supervisor needs a broader training.

Maor, Ensor and Fraser (2016) conducted a specific literature review on the use of technology in supervision. The authors selected 18 empirical studies on the topic, seeking contributions from web-based tools to develop collaborative supervision. Most studies have pointed to the importance of tools in broadening the dialogues and interactions between supervisor and student: “they created virtual spaces that combined technology and pedagogy in a process where research projects could be developed in a more collegial and collaborative way”

(MAOR, ENSOR, FRASER, 2016, p. 172). The study by Aghaee and Keller (2016) illustrates this result because it investigated the contribution of a learning support system in promoting peer interaction in the production of their Bachelor's and Master's thesis. They concluded that the system contributed to peer review, active participation and final opposition, and this contribution varied depending on the stage of the thesis development, on the supervisor's control and assessment, on the supervision of students, and so on.

In our survey, the category “Technologies in supervision” was also notable and it included ten papers (MASSI; GIORDAN, 2017). In it, we included researches that investigate the changes and potentialities that technologies bring to the work of supervision. According to Bianchetti and Quartiero (2010), the knowledge production model imposed for research is directly linked to information and communication technologies, since they contribute to the significant increase in their workload and they extend the time dedicated to this activity through *online* tools. Although there is work overload, Buttery, Richter and Leal Filho (2005) discuss the potential of electronic communication for orientation work, through discussion groups among the students, *online research methodology courses, online* supervision - without the need of face-to-face supervision - and discussion of models of supervision for mentors. Another recurrent type of research investigates mentoring relationships developed exclusively *online* or through mixed models.

Sidhu, Kaur and Fook (2016) investigated how much the supervisees depend on their supervisors, at Malaysia's largest public university, on the use of digital tools through questionnaires applied to 132 graduate students, some of whom were directly interviewed. They concluded that to conduct research and other online academic matters, students did not depend on mentors, but they needed their help to use tools for analysis, visualization and organization of data. As a result, their dependence also depended on the stage of the research.

Mixed supervisory models were investigated by Heinze, Heinze (2009), Augustsson and Jaldemark (2014) and Crossouard (2008). Augustsson and Jaldemark (2014) analyzed 423 utterrances of advisors on master's thesis

produced by Bachelors of Behavioral Science. Students enrolled in an Education course produced six drafts of their master's thesis that were submitted to the learning management system (LMS) and reviewed through the Microsoft Word's Track Changes by their advisors. These corrections were analyzed and categorized into three groups: recommendations, development and problematizations, according to their recurrence. Given this, the author proposes a theory of communicative exchanges in supervision of dissertations. Crossouard (2008) also investigated interactions in online learning systems, specifically in peer discussions in forums that can contribute to more collaborative learning. She noted that this model can contribute to the construction of collective identities, moving away from the dyadic model of doctoral research supervision. Heinze and Heinze (2009) proposed a supervision model called “blended e-learning skeleton of conversation”. This model required at least three main cycles of paper submission and review by advisors with the support of various forms of technology (text editor, file exchanges, Facebook messaging) and general guidance on this review process. The results pointed to the importance of online communication in supervision.

In the online context, Sussex (2008) analyzed a set of tools that can contribute to the process of supervision, classifying them into a taxonomy: synchronous and asynchronous; written or spoken; Information Technology (IT) assisted communication or non-IT assisted communication; Ephemeral or recorded/persistent. This taxonomy allows us to identify different forms of communication and their characteristics: more or less dependent on new technologies; recoverable or not etc. The author concludes by pointing out that the remote supervision experience requires the use of multiple technologies, depending on the students, the topics and the research development.

Given the general context of academic research and in particular the role digital technologies play, reported above, we situate our object of study in the training and performance of mentors of an online specialization course offered to science teachers from public schools that required the production of a final paper in the form of a monograph. Based on the sociocultural perspective, which seeks

to understand an actor acting with cultural tools (WERTSCH, 1998) and how activities are organized through systems (ENGESTRÖM, 2001; 2015), this study aims to identify and analyze online tools used by tutors-supervisors and their roles in producing the monographs, as well as the tensions involved in learning in the research supervision process. As a result, we propose a tool to identify and analyze the interactions between research training activity systems, which can be used to track the supervisor's training process.

THE FUNDAMENTALS OF THE ACTIVITY SYSTEMS MODEL OF THE CULTURAL-HISTORICAL ACTIVITY THEORY

Engeström proposed the interaction between two activity systems as a unit of analysis, within the scope of what he calls the third generation of Vygotsky's Cultural-Historical Activity Theory (ENGESTRÖM, 2001). The notion of unity of analysis goes back to the basic concepts of the Marxist perspective of reconciling the construction and the analysis of reality from “a living cell” or from a constitutive and irreducible entity of the whole, having the ability to represent and analyze any system of human nature. Basically, the interaction between the systems occurs through the sharing of their objects, which are part of a schematic arrangement of seven terms, as shown in Figure 1, illustrative of the Academic Research Activity System. By way of example, we discuss the context of research data production and we employ the main concepts involved in the activity system model.

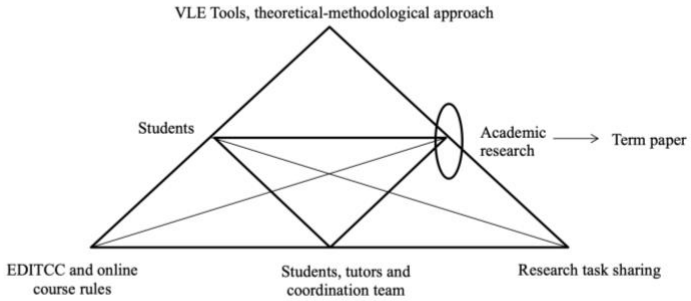

Figure 1: Academic Research Activity System (ARAS) model for academic supervision. Source: the authors based on Engeström (2001).

To develop their term paper, the students were trained through a specific guided study, named EDITCC, which contained texts and tasks related to the research process and it was proposed by the coordination of the course. The guided study was optional and organized as a guided study based on research articles about classroom issues published in conference proceedings from the Science Education field. Their online work was developed within the virtual learning environment (VLE), which contained forums and dialogue tools to promote interaction between students and tutors. These tools are located at the apex of the diagram and fulfill the role of ARAS mediation media, as well as the theoretical and methodological approach of the research. After two months of working on the term papers the students presented it on-site to the entire community of students, tutors and coordinators of the online course, which form the ARAS community and are located at the bottom center of the diagram. Individuals and community share a common object - located in the middle of the right side of the diagram - namely academic research, which culminates in the term paper.

ARAS is the representation of a specific model of research and supervision based on classroom research developed by teachers. Therefore, the tools of this activity system constitute a form of mediational tool to achieve the common task of the community, respecting its rules, but also promoting autonomy and individual adjustments. The rules are represented in the lower left corner of the diagram and they are based on documents produced by the course coordinator and also by the partner entity, the State Department of Education. Finally, to conduct the research process on the construction and implementation of a classroom teaching planning, the tasks associated with this process are divided between mentors and teachers in training, which is represented in the lower right corner of the diagram.

Another activity system of which the mentor interacts and participates, now in the position of an individual in training, is the supervision activity system (Figure

2). A system of academic mentoring activities was set up to support tutors in their teaching and mentoring activities. They assumed the role of individuals in training and they formed a community together with a group of experienced online tutors and professors. This activity system with specific rules and division of tasks had the learning of teaching and supervision as its object, being in permanent interaction with other activity systems of the specialization course, especially with the academic research activity system (Figure 1).

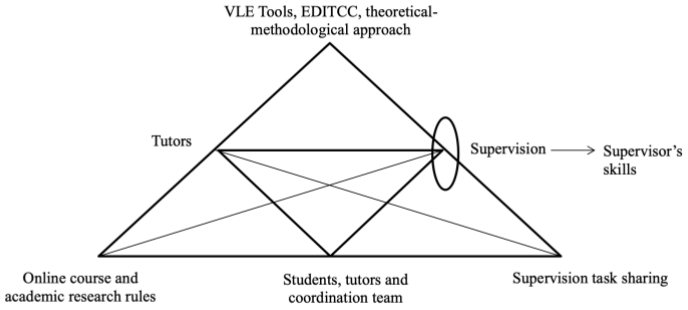

Figure 2: Supervision Activity System (SAS) model for academic supervision. Source: the authors based on Engeström (2001).

The change in position of the guided study (EDITCC) among the systems stands out, moving from the ARAS' rule (Figure 1) to the SAS' tool (Figure 2), which configures an interaction between the systems by means of a tool with regulatory capacity of the activities. The EDITCC plays a role in discussing classroom research models, serving as a mediator of interactions between agents of both systems. VLE tools are also shared between systems, however, for different purposes, which indicates the development of tutors in the role of supervisors and students in the role of researchers.

Wertsch (1998) brings another relevant contribution to the Cultural-Historical Activity Theory by advocating the existence of heterogeneous cultural tool kits, from which the individuals involved in an activity take some of them to

undertake mediated actions. Heterogeneity refers to the diverse material of mediational tools or media. It ranges from oral, written, graphical or, at the limit, multimodal, to the means employed to convey information. By way of example, software and stylistic features of diagramming, passing through the typical forms of reasoning, such as syllogism, hypothesis, argument, etc. Wertsch argues that in order to analyze and also constitute mediated actions, a unit of analysis must be employed to maintain the essential link of the irreducible tension agents-acting-with-cultural-tools, so that mediation is considered as the result of this tension. That means not to isolate the individual from the tools.

Our goal aligns with the propositions of Engeström (2001, 2015) and Wertsch (1998) as we seek to identify both the most common functions of using cultural tools in a system of activities and the supervision for research, which establishes permanent interaction with other systems of the online course. Given the scope of this paper, we will only analyze interactions between the ARAS (Figure 1) and the SAS (Figure 2) of the online course activity systems. It will be done through the tools assigned by the tutors and their functions in use, considering the response to an instrument of research, as detailed next.

METHODOLOGY OF DATA COLLECTION AND THEIR ANALYSIS

Based on this SAS and international literature about the supervisors' role and activity we built a questionnaire and applied it after one year of supervision, when they completed their work. In this paper, we initially present a systematic and quantitative analysis of the complete questionnaire, containing 11 questions answered by 27 tutors, who formed the entire group of the supervisors. Then, based on this analysis we identify and discuss the “heterogeneous kit of mediational tools” associated with online research supervision (WERTSCH, 1993). We analyzed the 27 text-format answers to the 11 questions addressed by the coordination with a final report character, regarding the supervision activities developed by tutors over fifteen months in the online course. The questions asked the tutors to reflect on their activities as research supervisors, on their perceptions and learning about these activities, comparing them with

face-to-face supervision and their previous experience on academic research as students.

The 27 mentors had a degree in natural sciences and at least a master's degree in the Science Education field. There were 10 men and 17 women with an average age range of 30 years. Each mentor was responsible for a group of students and guided them in the development of modules on content and methodologies of Science Teaching as well as in their research to elaborate their term paper. They agreed to participate in our research through an Informed Consent Form.

The specialization course was developed in 5 modules, being four of them related to content and methodological aspects of Science in Middle School, having a theoretical and practical character to help the students with the production of teaching plannings at the end of each module. The fifth module was about an investigation based on the application of a teaching planning by the students in their own classrooms (these students are also called supervisees in the current text), whose final task was to produce a term paper.

In order to identify the most recurrent themes brought by the subjects of this research, we initially identified the 100 most frequent words, which were at least three letters long and were not overly open to the point of not pointing to the research theme, such as connection adverbs, pronouns etc. At the end of this process we identified the following terms and their respective frequencies: student (s) (457); supervision (294); work (285); term paper (TCC) (252); research (200); course (146); process (145); group (121); form (118); EDITCC (104). From these terms, the content of the questions and the sociocultural perspective, we built 16 thematic categories that were used to classify 393 occurrences in the tutors-supervisors' answers.

In Table 1, we present this result and indicate two major groups of categories: *the learning* and *the development of supervision*. The items grouped in *the learning of supervision* category relate to themes that contributed to the process of the mentors' training, for example, the *difficulties of supervision* and what the mentors have learned from them. The items in the *supervision*

development category represent themes and resources that have proved to be important to accomplish the mentoring work with students. Then, *the EDITCC* is related to contents in the guided study format - based on articles published in conferences proceedings - that guided the research procedures, and *the dialogues about the research* were asynchronous interactions established between supervisors and their supervisees through a dyadic tool available in the virtual learning environment (VLE).

Table 1: Categories, sources and references in the questionnaires organized into *the learning* and *the development of supervision categories* (highlighted in gray).

Category	**Source**	**Occurrences (frequency)**
EDITCC	27	33 (8.4%)
Research Dialogues	22	32 (8.1%)
Learnings from supervision and its characteristics	22	32 (8.1%)
Difficulties in supervision	23	32 (8.1%)
Term paper (TCC) assessment instrument	19	31 (7.9%)
On-site and online supervision	22	28 (7.1%)
Formation of groups of supervisees	24	27 (6.9%)
Presentation of the term paper	26	27 (6.9%)
Forum or group of supervisors	21	25 (6.4%)
Previous experience as a supervisee or supervisor	24	25 (6.4%)
Dropout	24	25 (6.4%)
Discussion Forum	19	23 (5.9%)
Expectations of supervision	21	23 (5.9%)
News Forum	13	15 (3.8%)
Supervision training	11	12 (3.1%)
Text editor function	7	7 (1.8%)

Source: produced by the authors.

The *learning categories* correspond to a total of 151 occurrences, representing 38.4% of the total. The *development of supervision categories* occurred 242 times, representing 61.6% of the total. These categories identify most of the activities that are performed in the ARAS and SAS systems and for this reason, their occurrences will be analyzed below, focusing on checking the interactions between them, as well as the tensions arising from them.

RESULTS AND DISCUSSIONS

As for the *development of supervision*, we use the concept of the heterogeneous kit of cultural tools, proposed by Wertsch (1998), to identify 3 groups of tools that mediated the supervision process. They were grouped according to their functions in use so as to remain faithful to the mediated action as our unit of analysis. One of the functions observed was the interaction between supervisor and supervisee, being quite common in any situation of supervision, as well as the evaluation and review functions of preliminary versions of the term papers, grouped in a second set of tools. These two sets of tools mediated actions located in the mentoring activity system (Figure 2) and also in a second academic research activity system (Figure 1) that tutors/supervisors set up along with students throughout the course.

A third type of tool has been unusual in relation to other experiences reported in the literature and its functions in use can be considered a result of the way the online course activity systems were organized. Because it was an online course offered to hundreds of in-service teachers and it had dozens of tutors, mostly doctoral students being trained to become professors and supervisors, it was organized a system of support activities to help the tutors. It had the participation of professors experienced in teaching materials, supervision and online work. Thus, the organization of these activity systems derives from a common object, which is the research training, shared among higher education instructional activity systems. Therefore, the object shared between the activity systems was guided by the purpose of research training of all the subjects involved in the online course. This can be considered a cohesion and a

fundamental factor to articulate the operation of their activity systems, specially because of the tensions between them.

Interaction tools

The interaction tools were represented by the forums and dialogues produced by the tutors and students about their research project, specifically the *research dialogues*, *discussion forum* and *news forum*. According to Sussex (2008), these are asynchronous, written, IT assisted communication and permanent tools. The *research dialogues* were created in the VLE of the online course for dyadic communication between supervisors and supervisees. The *news forum* served to disseminate general information. Another communication space created for the supervisors was the *discussion forum* that was configured in a collective supervision space, simulating the "research group" in which discussions pertinent to all students would be conducted. As the research proposal about the teaching plannings produced by the students was common, we had the hypothesis that this tool would be pertinent and widely accessed, however, the mentors reported another result.

> [...] I sent a collective message with instructions and thoughts that demonstrated what the fact meant, at least in academic terms, and from this moment on I dedicated myself to individual supervision, since my group of students in Year I did not develop the practice of being guided by the news forum. As I realized this, I chose to use the dialog tool for the TCC. Mentor A

> I used the dialogue and the news forums a lot, the discussion forum was open, but the teachers in training barely used it (this happened in the TCC and in the course). As for the latter, I believe it is vital (whether used or not), or the most democratic tool within the groups. Mentor B

Tutors described their efforts to create a community of practice, a model highlighted by Dysthe, Samara and Westrheim (2006), Wisker, Robinson and Shacham (2007) and Crossouard (2008), among their supervised student groups. This aspect was promoted by the supervision activity system and it is consistent with the actual demand for collective supervision. However, the students were not comfortable with this model and adopted the mode of communication one by one through dialogues with their tutors. The number of

references (32; 8.1%) to the *research dialogues* reflects their main role in this process. The mentors who attended a supervision support forum, as discussed next, had their expectations contrasted with their students' attitudes, but they also caused tensions because of the ways they participated in the support forum or because of other ways they interacted in the supervision activity system. The interaction between the systems takes place implicitly, through the mentor's use of the tools in both activity systems.

The reasons why the tool has not fulfilled its intended role are associated with the resistance of the students, as the following records illustrate:

> I opted for individual guidelines, even though most of the guidelines are very similar for everyone. But there is a difference in the treatment we need to give to each of the students: those who understand everything more easily, those who need more explanation, those who need to be told off, those who need affection... And this is only possible with individual supervision. Mentor C

> Initially I chose to create a forum where the basic questions of the students could be solved through questions elaborated by me. However, the forum was underused by them. This may have happened for two reasons: first because the course members were already tired of the subjects and consequently of their tasks, which were frequent in the forums; second, because the students were anxious about this stage and they understood that their doubts were more personal, and strongly related to their research interest, than collective ones. Mentor D

This data is important because it contradicts the tendency pointed out in the literature that research supervisions should assume an increasingly collective character, even aiming to optimize the time that the advisor devotes to this activity (BIANCHETTI, QUARTIERO, 2010; MCCORMACK; PAMPHILON, 2004). The rejection of this model was stronger among the students, who demand individualized attention, but was also present in the supervisors, probably due to the individual supervision model to which they were submitted in their education. There is an explicit tension between the individual and the collective supervision models, which might be related to specific aspects of the online specialization course, as pointed out by the mentor D who identified in the discussion forum tool, which was frequently used in the course, a possible limitation. On the other

hand, in the mentor C's statement, the individuals' idiosyncrasies, related to aspects of commitment to perform the task, are common to online and face-to-face training models. To publicize an individual's engagement or performance difficulty can emotionally compromise the subject who will be judged by a more advanced pair in front of his or her peers. Thus, the explicit tension between the so-called more democratic model, as termed by mentor B, and the individual supervision model must also take into account the emotional aspects and not only the similarity between the supervision needs, as highlighted by mentor C. The tensions produced between these models of supervision, involving time reduction and attention to individual needs, can produce syntheses in the form of hybrid models and they can contribute to the expansion of the learning cycle (ENGESTRÖM, 2015) that is established in training processes of supervised research.

The heterogeneous interaction tool kit has brought to light central issues in the development of supervisory practices, which are the individuality and the collectivity. Surely there are many aspects of the interaction that are key to build a supervisory model for supervisors in their early supervisory experiences. What we want to highlight here is that the ways of using asynchronous, writing, IT assisted communication, and permanent tools are at the interface of interaction between ARAS and SAS and they can, therefore, promote expansion movements due to the tensions produced by such interaction between systems.

Support tools

One of the mediation tools mobilized in the academic supervisory system was the discussion forum, whose main functions were to share experiences, discuss common solutions to problems and support mentors in teaching and mentoring work. Considering Sussex's (2008) classification, these discussion forums are classified as asynchronous, written, IT assisted communication and permanent tools. Mentors refer to their peers' experience in SAS as a reference to their practice, which indicates the importance of this tool for their training. Constant communication in the forum or group of supervisors helped them deal with the difficulties they faced during this process. The coordination team also

provided direct, general and specific instructions, as well as presented the rules of supervision and it was referred by the mentors as a support for their practice.

The groups of students were formed by the coordination that aimed to respect the original structure of the course, keeping the students with the mentors who had already guided them in the regular activities of the contents and the methodologies modules. However, some rearrangement of students in the groups was necessary, to equalize the distribution of students by mentors and also to equate the unavailability of some of them to supervise.

> I believe that staying with the students we had already worked with was a facilitating factor because we already had a stable working relationship. However, the relationship with the new students who were only at the moment of supervision was good and the result of the whole group ended up being similar. Mentor E

Following the arrangement of the groups, the coordination provided a brief guidance on the work of the mentors, which served as a mentoring training. This step took place during a day of a face-to-face team meeting. The preparation for this meeting was based on the questions raised by the mentors in the mentoring forum about what they thought this job would be like.

> I consider that the training on 08/13 was an attempt to transmit to the mentors safety and the design of research proposals, but certainly each mentor felt the need to have autonomy to adapt the proposals according to their background and capacity. At this point, it was necessary to self-evaluate before deciding which supervisory profile to follow. I believe that thanks to this autonomy, it was possible to do a quality job, or at least to seek it more securely. Mentor F

> [...] the moment concerning supervision was when I had the greatest autonomy. In the training on 08/13 this was evident, especially when the coordinator of the referred course answered the questions of some mentors about aspects of supervision, such as the autonomy of the student and the subjectivity in the research process. Mentor E

In addition to these moments, a permanent space for discussion and questions was created between the supervisors and the coordination through the

supervisors forum and through the support mentors who followed all the work in the course.

> Particularly, I found the process very good and interesting because freedom has been given to the supervisor, who could develop from it. Regarding the supervision forum, this was important, because when problems arose they were discussed within the group, so there was an exchange of experiences and collaborative work, which I evaluate as positive.
> In addition, the process was built, at first it is traumatic, but the result is positive, as all problems have been solved. Mentor G

> As talking to some friends I noticed that some term papers from their groups were sometimes entirely copied from somewhere, which brought up a subject I can say. It was with some sadness that I noticed plagiarism practices in several of my students. Not in the whole work, but several fragments, linked by one paragraph or another. Mentor A

This support from the whole group proved to be important for the supervisors to overcome difficulties resulting from lack of experience and organizational aspects of the work. The statement from mentor A reveals the importance of the group in sharing difficulties, especially the negative feeling (sadness) involved in the supervisory relationship, related to plagiarism, a recurring and controversial theme, discussed in a group to understand its multiple practices. Course coordination indirectly tracked the students' work through reports produced by the supervisors and the student plagiarism practices were abundantly observed by them. It was established a tension that involved both systems of activities.

In the direct communication of coordination with students through asynchronous, written, IT assisted communication and permanent tools, SAS rules were stressed at the limit of authority suspension, or lack of it, of the mentor in dealing with the plagiarism practices. Here, the interaction between ARAS and SAS was mediated by a set of tools that enabled a distributed, vertical and a *non-interactive authoritarian* communication approach (MORTIMER & SCOTT, 2003), such as the news forum. The hierarchy between the systems allowed the course coordination to work in both and to perform a simultaneous formative action for students and mentors. This practice contrasts with the supposed

autonomy reported by the mentors E and F, which indicates yet another contradiction that has been established between the systems and the interaction between them. This and other contradictions promoted a movement of legitimization of the rules of the SAS, which indicates that there has been a transformation in this system, in order to give the necessary autonomy for the mentoring work of the mentor. This transformation can be characterized as an expansion of the activity system, in the sense that it has promoted expansive learning (ENGESTRÖM, 2015) in both.

In the relationship between ARAS and SAS, there is another tension that may give evidence of a transformation of activity systems. In this case, the ways of using a tool in both systems bring evidence of the movement that occurred. The Guided Study to the Initiation of the Term Paper (EDITCC), which was produced to support students for research on the production and application of didactic teaching sequences, served as a reference for the mentor about the research model and its methodology. This form of mediation was cited by the mentors and it was identified as a category of analysis. Initially, the EDITCC had presumed its audience (the students), however, as it was not mandatory, most students were unaware of its contents. This point was highlighted by one of the mentors as something to be evaluated in relation to supervision. Nevertheless, the supervisors recovered part of this material as a support to conduct the research of their students in a movement that indicated a change in the purposes of using the tool.

> [...] I verified that there were basic aspects of research, such as the difference between a research problem and the problematization of a didactic sequence, which none of students in the group knew. Even though there was a class at EDITCC just about that. What I did during the supervision was to try to indicate to the students in which EDITCC class they could find information about a certain aspect of the TCC that they had questions about, to indicate readings of articles discussed in the EDITCC classes that had similarities with their work in progress, and to relate the EDITCC class to the guidance it provided, among others. I really liked the content of EDITCC [...] Mentor E

These considerations point to the EDITCC as a mediator of the research supervision, which seems to have been fundamental for some advisors to conduct this first supervisory activity. What should have been taken as a rule for developing the stages of academic research was used by the mentors as a tool to guide or to participate in the organization of the stages of the student's research. As identified in plagiarism practices, the tension between activity systems seems to be the means of provoking creative transformations to produce movement in the contradiction between the ways of using the EDITCC cultural tool, thus being indicative of tutors' expansive learning.

The heterogeneous supervision support toolkit provided tutors with important mediations to understand and achieve the research model presented in the SAS. Moreover, we observe ways of using the tools not initially foreseen in either systems. Thus, besides observing the tension caused by the use of tools in the interaction between the systems, we verified creative transformations of the functions of its use by mentors and students.

Evaluation and review tools

The assessment and review tools include to mobilize functions that use editing software, the TCC assessment tools and the TCC presentation. Adopting the Sussex (2008) classification, they are considered asynchronous, written, non-IT assisted communication, and permanent tools. As all exchanges between supervisors and supervisees were through written texts, some supervisors pointed to the role of tools not provided by the system to guide students, especially the use of Microsoft Word and its revision tools. Some mentors complained that students did not understand the functions in use of this tool.

> One way to maintain a continuous dialogue about the text was to use tools from Word, such as the "New Comment" with the "Track changes" on. I realized that they facilitated the materialization of the issues to be rethought without taking away the autonomy of the teacher-author. Mentor H

Another assessment and feedback tool that mentors had was the assessment of TCC by other mentors. For this, the coordination organized a

discussion forum in which the advisors indicated which points should be evaluated, so that this instrument was produced collectively.

> The assessment was built by the group in the supervision forum. The instrument that the mentors used for evaluation reflects a collective construction and it contemplates the minimum requirements to support or not the approval of the student. I could not identify similarities or differences in styles of supervision between the 2nd evaluator and myself. Regarding the papers produced, there were some similarities among some of them, especially regarding the difficulty to understand the difference between a didactic sequence's objective and a research's one; the lack of an adequate methodology for data collection; the absence of a dialogue between the student's speech and the bibliography he/she consulted, when presenting and discussing the data, among others. Mentor I

In addition to formalizing the evaluation of the papers, that instrument served as a reference for each mentor to evaluate their group and their supervision. Several reported that such time served to reflect on the quality of the work they had done with the students. It is important to note that the assessment tool was built by the mentors in the *Forum or group of supervisors* and, therefore, it represented their own ideas about what constitutes quality research within the proposed research model in SAS. The horizontal relationship in the interaction that mentors established in their forum was in tension with their supervisory models, which they themselves could not take away from the "autonomy of the teacher-author"[3]. Peer review, cited by mentor I, also played an important role in the supervision activity systems, which led to a reflective process on the construction, application and evaluation of a research quality assessment tool in ARAS. Again, the interaction between the systems is evident and it was mediated, in this case, by the assessment tool built by the mentors in cooperation with the course coordination. As the last stage of an expansive cycle (ENGESTRÖM, 2015), the reflection on the whole process was made from the comparative discussion between peers and raised tensions, especially about the rigor to which the instrument should be applied. Thus, the evaluation instrument,

[3] The teacher-author is a denomination of the online course student who was a teacher in continuing education.

a shared cultural tool between ARAS and SAS, in their different possibilities of use, has a central role in the formation of the research supervisor in the model proposed here.

Another assessment instrument was applied to the presentation in person of the TCC at the end of the course. This stage was fundamental, mainly regarding the emotional aspect, allowing the subjects to have a closer contact with their supervisors than online.

> The presentation in person was a very important moment in the final stage of the specialization course. To know the students in person who I only knew 'virtually' was very gratifying, because it was possible to see their satisfaction with their own intellectual growth.
> The presentation gave the opportunity of a different perception of the papers compared to the evaluation, according to the readings. Thus, the grades were slightly increased after the presentation. Moreover, it was a moment where I realized the importance of the emotional factor in the teaching-learning processes. Mentor J

The presentation and defense of the term paper was a very tense moment and expected by the team members. At that moment, the students argued before two evaluators, one of them being their supervisor, their research project, the results, the conclusions, etc. Practically, ARAS and SAS merged, as the students' and their supervisors' work were being evaluated, which was more evident among mentors. The tensions established in the interaction between the systems were mainly affective because, besides being the first face-to-face meeting, a formative cycle had been concluded. Also, it represented an affective contact between student and mentor. This aspect is recognized in the literature about supervision as an important point in the process (LEDER, 1995). Several mentors posted comments from the students and photos of that day in their report, again reinforcing the affective character of the activity.

CONCLUSION

In this article we analyzed the forms of mediation of the supervisory work developed in a VLE. We characterized the components of this environment

through two systems of academic research and supervision (ARAS and SAS), and analyzed reports on supervision produced by mentors at the end of the TCC production follow-up process. Through the reports it was possible to identify three types of tools that mediated the supervisory activity: interaction, support and evaluation and review. The ways in which these tools are used and the organization of ARAS and SAS have raised various tensions between systems and their agents. This led us to identify expansive learning movements through creative transformations of the ways the tools are used and the systems themselves.

In addition to this, we identified the main ideas of the mentors about learning how to supervise: the supervisory work is complex and it must be built and learned through practice and with the students. Several mentors indicated that to respect the individual characteristics of each student was the most important lesson of this experience. They sought support from their previous experiences as supervisees, from the rules, from their trainings and from the tools offered by the online course community to develop their work. The main differences observed between face-to-face and online supervision relate to the role of writing in the development of research. It can be difficult when students do not understand written guidelines, but they also serve as a readily accessible form of memory during the process of supervision and as a stimulus to written production that could be introduced into the term papers. Thus, writing has proved to be an ancient instrument that clashes with online guidance and causes a contradiction that leads to the transformation of the activity through new forms of mediation.

Therefore, by discussing a specific practice with quantitative and qualitative analysis, we were able to gain a broader understanding of an activity that is little investigated in the literature from a sociocultural perspective. The mediating tools in these systems of academic research and mentoring helped to identify some tensions and contradictions: 1) writing was a tension between mentors and learners, but it also served as a record of the supervisory process and a way of promoting writing throughout it; 2) the collective supervision

proposed by the course coordination was successful in creating a community of practice for mentors, however, it was not effective within the group of students of each supervisor. Based on these analyses and on the supervisors' words, those tensions might represent possibilities to expand the academic research and supervision activity systems from the online to the on-site context.

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