

# Coordinated actions in experiences in teaching and learning online<sup>1</sup>

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## ABSTRACT

Even though immersed in activities provided by digital technologies, we realized that most institutions are still constituted in their structure and in the curricula of their courses to serve students in person. The outbreak of Coronavirus Disease 2019 (COVID-19), and the need for social isolation drove rethinking and creating alternatives for the new reality. We cartograph the experience of proposing coordinated actions in the Mathematics Education and Teaching III discipline of a Mathematics-Licentiate course as a way to understand and assess student learning. Observing the class and the context, establishing the assessment criteria together with the students makes you co-responsible for your learning. The coordinated actions corroborated with the consolidation and the gradual production of arguments related to the themes studied, perceived by the monitoring of activities. We direct our eyes to experiences and interactions through writing expressed in coordinated actions in the context of online education.

**KEYWORDS:** Coordinated Actions. Learning. Online Education. Pandemic.

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*Ações coordenadas em experiências no ensinar e no aprender online***RESUMO**

Mesmo que imersas em atividades proporcionadas pelas tecnologias digitais, percebemos que a maioria das instituições ainda são constituídas em sua estrutura e nos currículos de seus cursos para atender os estudantes de forma presencial. O surto do Coronavírus Disease 2019 (COVID-19), e a necessidade de isolamento social impulsionou o repensar e a criação de alternativas para a nova realidade. Cartografamos a experiência de propor ações coordenadas na disciplina Educação Matemática e Docência III de um curso de Matemática-Licenciatura como uma maneira de compreender e avaliar o aprender dos estudantes. Observar a turma e o contexto, estabelecer os critérios de avaliação juntamente com os estudantes o torna corresponsável pelo seu aprender. As ações coordenadas corroboraram com o adensamento e a produção gradual de argumentos referentes aos temas estudados, percebidos pelo acompanhamento das atividades. Direcionamos nossos olhares para as experiências e interações pela escrita expressas em ações coordenadas no contexto da educação online.

**PALAVRAS-CHAVE:** Ações coordenadas. Aprender. Educação online. Pandemia.

*Acciones coordinadas en experiencias de enseñanza y aprendizaje online***RESUMEN**

A pesar de estar inmersos en actividades que brindan las tecnologías digitales, nos damos cuenta de que la mayoría de las instituciones aún se constituyen en su estructura y en los planes de estudio de sus cursos para atender a los estudiantes de manera presencial. El brote de la Enfermedad del Coronavirus 2019 (COVID-19) y la necesidad de aislamiento social impulsaron a repensar y crear alternativas para la nueva realidad. Mapeamos la experiencia de proponer acciones coordinadas en la disciplina de Educación y Docencia Matemáticas III de un curso de Licenciatura en Matemáticas como una forma de comprender y evaluar el aprendizaje de los estudiantes. Observar la clase y el contexto, establecer los criterios de evaluación junto con los alumnos te

hace corresponsable de tu aprendizaje. Las acciones coordinadas se corroboraron con la consolidación y la producción paulatina de argumentos relacionados con los temas estudiados, percibidos por el seguimiento de actividades. Dirigimos nuestra mirada a experiencias e interacciones a través de la escritura expresada en acciones coordinadas en el contexto de la educación en línea.

**PALABRAS CLAVE:** Acciones Coordinadas. Aprendizaje. Educación en Línea. Pandemia.

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## Introduction

We live part of our time immersed in activities provided by digital technologies, because we make countless purchases, talk with friends and family, inform ourselves about the climate, watch series, movies ... But in the field of Formal Education, there are still few, if perhaps, the necessary adaptations or updates in the context of the emerging classroom are still few or perhaps slow.

In Higher Education, we noticed some changes, but most institutions are still constituted in their structure and curricula of their courses to serve students in person. With the progression of the Coronavirus Disease 2019 outbreak (COVID-19), and consequently, with the need for social isolation, each institution created alternatives to the new reality, both with regard to the structure of operation of the university itself and for the development of students, which has currently caused some teacher transformations that suggest to us, the pedagogical rethinking of a class, of a Discipline.

Immersed in this existential experience we were challenged and rethinking our practices so that students could continue their studies through online education, students who belong to a digital generation, who upon completing graduation will act in a technological society. We lived a whirlwind of emotions, situations, ideas, commitments and thoughts.

Thus, in this study we cartograph the experience of proposing coordinated actions in the discipline Mathematics Education and Teaching III of a Mathematics-Degree course as a way to understand and evaluate students' learning. We start from the understanding that to cartografis is to inhabit an existential territory, according to the studies of Alvarez and Passos (2012), which involves being immersed in researching our own actions and intentions, as teachers and teachers.

The choice of the cartographic method is justified in the fact that it enables us to have different forms of investigation of the phenomenon, and when choices emerge from living with the other in the same explanatory domain, as well as from conversations with experiences experienced, shared and that motivate us to rethink and problematize about what touches us in relation to the other.

In this sense, we chart briefly in the section of the walk and territories through which we travel. little of the walk and the territory... The Federal University of Rio Grande – FURG, has been making changes in the curricula of teacher training courses, meeting the educational policy of the country expressed in the National Education Plan 2014 - 2024, which includes, among other aspects, the Common National Curriculum Base (BNCC), and ordinance no. 1,134, of 10/10/2016 that allows 20% of the workload of courses to be carried out at a distance. Thus, some disciplines were restructured from a fully face-to-face composition to a hybrid organization, that is, face-to-face with some online activities.

The discipline Mathematics Education and Teaching III is a six-monthly Discipline of the Mathematics-Degree Course, which was created from this reformulation and is offered in the third semester of the course in a hybrid way. In 2019, the first year of its offer, all students were offered, exceptionally, at a distance so that they could adapt to curricular reformulations and coordinate the activities of the Discipline with their availability of time. We highlight that FURG's Mathematics-Degree Course is nocturnal and, therefore, most of its students are workers. In

2020 the Discipline would be offered in a hybrid way, however, according to the CONTINGENCY PLAN of FURG to cope with the PANDEMIC of COVID-19, the Discipline was offered, again online.

In 2019, we started this Discipline, with about 80 students, which was structured and taught by us, authors of this Article, (full professor of the Discipline and two PhD professors). Each of us, in order to develop activities with the students, provided a period for online guidance, at different times and days of the week, and also in face-to-face periods in which we were in the collective. With the evasion of some students, for various reasons, we finished the Discipline with 60 students. In 2020, we had 25 students enrolled, but only 15 finished the Discipline. The first week was in person and the other ones occurred online with synchronous and asynchronous encounters.

We observed that the dropout of the students, in 2019, may have occurred, mainly, due to the difficulty of organization on the part of the students to experience a 90-hour Discipline, in a format for them not usual, since access to technology could be made at the University where we were in person available to serve them. As for the evasion, in 2020, we noticed that 10 students did not even start to attend the Discipline and that there were other difficulties, such as internet access in their homes, the organization in homes to perform studies, outside the school space, as well as stress and insecurity due to the moment of pandemic. And thus, we were challenged to rethink and reorganize the Discipline seeking to consider the flags that emerged from the interaction with our students.

In the next section, we will reflect on the (re)creation of activities and dynamics of the Discipline, in the Virtual Learning Environment (AVA), via Moodle Platform.

## Creating the Dynamics of Discipline

As we said earlier, the Discipline has 90 hours that we distributed, in 2019, in the AVA, in five topics entitled: Innovation of School Mathematics; The Professionalization of Mathematics Teachers in Brazil; Educational Integration Policies: school inclusion of people with special educational needs; Paradigmatic Changes and Proposals for Intervention in the Area of Special Education; Pedagogical Practices and Research in Educational Scope in Mathematics Teaching.

In 2020, due to the pandemic, we decided to condense in a single topic the discussions and activities present in the topics Educational Policies of Integration: school inclusion of people with special educational needs and Paradigmatic Changes and Proposals for Intervention in the Area of Special Education due to the intersection between the themes, to contemplate the workload of the Discipline, and to adapt it to the times and situations of students, we created the topic Inclusive Education.

To elaborate the activities and organize the dynamics of interaction, evaluation and updating of the Discipline; in 2019, we went to weekly meetings one month before we started it. We continue with the meetings throughout their development. In 2020, in a pandemic period, we held our meetings, in a way, online. We built in the AVA, a space with information necessary for the student (objectives, periods of realization and sharing of activities, format of the document, formatting of texts, place of forums, individualized dialogues to clarify doubts), objectively, and with a diagramming, so that students understand the activities and the importance in developing them.

At that moment, facilitating the access of students both with regard to the attraction for the organization of activities, in the visual field, as to information and interaction were movements in an attempt to awaken the student's interest so that he could study with us until the end of the Discipline.

We elaborated the Discipline as a learning environment and not as a repository of texts, videos and information, that is, we sought to propose research and textual productions articulated to concepts and theories in an argumentative conversation that shows and respects the positioning of the student, since we believe, as well as Bakhtin (1997), that language is an interactional and intersubjective process that constitutes man and is constituted and written by him and which is present in oral or written discourses and texts. Through different textual languages imagery, audiovisual or verbal, we have opportunistic and interlocution of students, with authors, scholars and with us enabling us to talk to the contents discussed.

However, we understand that there is only "language if we are in the same flow of consensual coordinations of consensual coordination of actions" (MATURANA, 1998, p. 22), and this would only be possible if the group of students and teachers established coordinated actions in the performance of activities and these were understood by coordinating the different points of view and reorganized and evaluated considering the flow of consensual coordinations of conduct. In this sense, it was a challenge for us to invite students to an online conversation and their academic experience is in face-to-face education. We then provoke ourselves to think about the processes and dynamics of evaluation of students' learning in this context.

Next, we cartograph the monitoring of the activities of the Discipline, which were being experienced and updated in conversations between us and students so that there was interaction so that we could understand the differences and evaluate coordinated actions in teaching and learning, as well as the consensuality legitimized by the collective.

### **Understanding and evaluating students' learning**

Understanding that the assessment is procedural and that learning is individual, we propose a first activity to meet the students. We asked, then, that everyone update their profile on the platform so that, in

addition to general information and the photo, they could express how they think about acting in the profession they have chosen and what possible contributions they intend, as teachers, in relation to mathematics teaching.

For Luckesi (2000), the evaluation of learning from an inclusive perspective, rather than being restricted to the approval or reproduction of the student, focuses on full development. Therefore, we needed, first, to 'listen' to the students, we believe, therefore, in the procedurality of the facts and in the cognitive development of the students. Throughout the Discipline, we tried to articulate the activities and evaluate the development of the students, seeking to understand how they articulated and deepened their learning expressed in the activities, that is, there were no specific or synthesis assessments, but the monitoring of the activities and the observation of the articulation, among them.

For Pesce and Brakling (2006),

The learning assessment tools should be adequate: the type of conduct and skill being evaluated, the essential contents planned and effected in the teaching process, the learning process of the student and the language. (PESCE; BRAKLING, 2006,p.94).

We chose instruments, easy to handle by students' hand, among them: web research, productions of reflective texts, PodQuest productions, and conversations in forums that were analyzed from the point of view of academic writing, orality and argumentation of students. In addition, as the concepts were being discussed and studied, we tried, in a procedural way, to resume them in later activities so that students could deepen and resume the concepts in a way that would complexitise them.

In the walk, perceptions and conceptions emerged. Thus, we bring some interactions, propositions and achievements of our students, in 2019 and 2020, which help us to think about the coordinated process of the actions we experience.



## Student interactions and propositions in 2019

The interaction between students both asynchronously and synchronously expands the possibilities of teaching and learning, because providing conversation among students in forums allowed observing and recording their formative processes through interaction. Such interactions were founding because they were a space for conversation and exchange of experiences that express in a flow the views, coordinations, propositions and arguments.

In Figure 1, we present an section of an activity that we propose in the forum, which is part of the topic entitled: National Integration Policies: school inclusion of people with special educational needs in 2019.

### Proposed activity

**TEACHERS AND STUDENTS IN A CHAT**

**Until 30/05**

**READING IN PROCESS...**

► Search the Internet for some scientific texts (article, dissertation, thesis...) on Pedagogical Proposals and Practices in Inclusive Education. After, choose only one of them and perform a careful and attentive reading in order to understand it to elaborate two or three questions.

By problematizing, when we question, we enable conditions to move our (in) understandings and thus suspend our certainties...

**Attention:** note the date of the text, the author, as well as the relevance of the text to the teacher training.

► Post, in the forum "Teachers and Students in a Conversation", the Text you have chosen, the questions and questions elaborated from reflect. In this forum you will have to add a new topic (referring to the article you have chosen) discussion.

**A CHAT IN AND BY COWRITE...**

► Choose one of the Topics posted by colleagues and read the Suggested Text. Then answer the proposed questions and post in the forum. Those who elaborated the questions should read the answers of the colleague and, thus, establish a conversation by co-write that means writing for themselves, with the other and for the other in and by language in (inter) action.

Source: The Authors (2019)

In this activity we integrated scientific research and reading, with the construction of questions that were triggers for a conversation between students, since they would have to read the text and answer the problematizations of one of the colleagues. In addition, with these movements we enhance the autonomy and responsibility of choosing the future teacher, as well as the elaboration of questions, activities related to the profession of being a teacher. Experiencing, in the academic space, listening to the student shifts the teacher from the authoritarian and dictatorial position to a place of otherness and understanding of the student's thinking and arguing; this was also our intention in that activity.

Quanto ao formato e à disposição dos materiais para a Disciplina, buscamos construir um material com informações fluentes, para que o estudante compreendesse o que estava sendo solicitado. Regarding the format and layout of the materials for the Discipline, we sought to build a material with fluent information, so that the student understood what was being requested.

In this process, of creating the Discipline, we noticed that the more directed and lean the information was, the better for the student, however, we emphasize that even so many students sent us messages asking and showing that they did not understand or have not found some information in the AVA.

Figure 2 presents an example of some interactions between students in the discussion forum, understood by us, as a space rich in information exchanges, knowledge and learning. We chose to present a section of the topic created and entitled in the forum: Fundamentals and Inclusive Pedagogical Strategies: responses to differences in school. We highlight that, in order to keep the identities of the undergraduates confidential, we identified them by Student 1, 2 and 3 - classification of the text.

### Activity proposed in the forum

Student 1:

- 1) Do you believe that there is any link between social inclusion and inclusive education? If so, what interference can we observe between these two inclusive processes?
- 2) For you what would an Inclusive Education be? And what is the role of the teacher in this Education?
- 3) Do you name the inclusive pedagogical practices mentioned in the article?

Student 2:

- 1) There is a link between social inclusion and inclusive education, because there is no way to speak separately from these two elements because the school forms citizens to integrate into society and vice versa. In the case of the principles that intertwine these two inclusive processes, we have the primary foundation that is the equity in which the issue of a society that does not discriminate the different and, yes, consorts with the differences in a joint construction of all individuals within the school environment (beginning of this structuring) will work. 2) Inclusive education is a modality of education in which it gives all citizens the right equal to meaningful, constructive, participatory and collaborative education within the regular school system. With regard to the role of the teacher in this Education, it is necessary that the teacher seeks ways to understand inclusive education and prepare activities that are pleasant to everyone through continuing education courses. 3) Activity with deaf students which these students will learn sign language together with the Portuguese language thus providing a continuous and joint construction in learning. It is through sign language that these students are propelled into sociocultural relationships within the classroom, creating a bond with wanting to learn and teach.

Student 3:

- 1) I fully agree with you, I left to read your answers after answering my questions. However, I believe that the activities would not have to be "pleasant" but understandable and accessible to all. Furthermore, I believe that it is extremely important that there be and discussed inclusion, from initial to continued formation.

Source: The Authors (2019)

In the forum, each student should create a topic and throw three questions from the reading of the text surveyed, after the answers of colleagues establish a conversation by co-write which means, according to Juliano and Laurino (2018), write to themselves, with each other and to each other.

We noticed that not all topics created by the students generated interactions, because each student chose the topic of interest. We consider it interesting to think of a movement so that the interaction would be present in all topics, so that there was no frustration on the part of the student who created the questions and these were not discussed. An alternative was to ask groups, teachers and students to take responsibility for not leaving a topic without interaction.

In addition, not all students returned to the created topic and established a conversation with those who answered their questions, even so this activity in the forum generated interaction between those involved and this action for us was sufficient since we understand that we are beginning to create a culture of an online academic conversation, because this operation is not recurrent in the actions of these students. For Maturana (2014) culture is a way of living with the other through a conversation network established in a domain of coordination of coordination of actions and emotions. In this domain established by the subjects involved, the culture emerges and with it an emotional environment between teachers and students through the personality of those involved, which affects the development and evaluation of activities throughout the Discipline.

We proposed an activity in the topic entitled: The professionalization of mathematics teachers in Brazil, in which we asked the students to access the materials available in the topic: a video and an interview of Professor António Nóvoa to Carta Capital Magazine, and

after studies elaborated a brief text presenting their understandings about the professionalization of mathematics teachers in Brazil.

In Figure 3, we present clippings from the last paragraph of three texts, which were evaluated according to pre-established criteria with the students for this activity. The first text met the pre-established criteria, the second partially met and a third little met these criteria. Throughout the evaluations, we tried to validate the processes of construction of the knowledge of the undergraduates based on the criteria established, because according to Maturana (2014) there are criteria for validating the explanations that go through the validation of the observer, in this case, the teachers of the Discipline immersed in the evaluation process by writing.

### Clipping of reflective texts

#### Student 1 - Meets the criteria

After this training, and even acting in schools, continued training is necessary, because in addition to changes such as the insertion of technologies, there will always be new learning proposals, and new means of transmitting knowledge. Therefore, innovation is always necessary, since generations change, and the way of teaching must be in constant change and improvement. And it will not be through seminars or lectures that continuing education should be based, but rather on workshops and projects that should be included in the school itself, through the discussion of new ideas among teachers.

#### Student 2 - Partially meets the criteria

Also thinking about this temporality of contexts, the idea of interdisciplinarity shows how the links between areas of knowledge provide a greater understanding of the world to the student. Therefore, promoting dialogue between disciplines beyond mathematics within the classroom connects the teacher to the student with tendencies to other sciences. Therefore, knowing that the profession is not done alone is fundamental to the quality of teaching.

Student 3 - Little meets the criteria

He talks about the technologies too and I agree, because we can not leave aside how harmful today the technologies in our daily life, because we are losing contact with those around us and entering a crazy addiction without us noticing and we find normal, but we also can't let go of the fact that it's a very important tool if used correctly, if we use it for example to make any math content in class clearer, surely students will love, be interested, and it will be a different, creative, and most likely better learning class for students.

Source: The Authors (2019)

First, Student 1 reflects on the continued formation from the technological changes that the current society has experienced and emphasizes, the rethinking of teaching practices nowadays. It also points to continuing formations directed to the needs of the school and community as alternatives for actions that teachers and other managers can develop. Thus, when evaluating the entire text, based on the evaluation criteria, we consider that the text contemplates what we request in the activity, because it presents reflections on current issues and discusses emerging themes present in the materials we study. In addition, formatting is in accordance with an academic text.

Student 2, on the other hand, approaches interdisciplinarity as the main theme discussed throughout the topic of Teacher Professionalization and concludes its text emphasizing that the teaching profession cannot be performed in isolation. However, other emerging themes discussed and presented in the materials available in the AVA could have been articulated to the reflections and positions on the current situation of education professionals. When addressing the theme of interdisciplinarity, the student could have argued a little more, as well as explained to the reader what he understands by interdisciplinarity.

Thus, we consider that the text presented partially meets the criteria established in the Discipline. The formatting is in accordance with an academic text, sent the file on time, but could meet the writing, presenting it more clearly.

Finally, student 3 reflects on the technologies, in the way it is inserted in society, its limits and possibilities of use for the teaching of Mathematics. However, it starts the paragraph referring to "He", but does not quote it, so the reader does not understand who the text is referring to. In addition, the paragraph that should resume the other topics discussed throughout the topic is limited only to technologies in today's society. Therefore, we consider that the text sent, for evaluation, as well as the clipping of the final paragraph under analysis, little meets the criteria we established for this activity in the Discipline.

At times, it escapes what was requested, little exposes the opinion about the role of the teacher and in most of the text exposes ideas, without articulation, cohesion and coherence of the authors present in the material on teacher professionalization among them Professor António Nóvoa. We suggest revision in writing, since the formatting does not meet the request for an academic text.

With the clippings of the texts we wish to cartograph how we teachers think and experience the process of evaluating students by coscribing. We seek to respect the processes, times and restrictions of each student, as well as contribute to the professional development of the future teacher who certainly already experiences processes of insertion of digital technologies.

### **Self-assessment in 2020 as a provocation to reflection: of self and Discipline**

With the offer of the Discipline, again, online, but now in a situation of daily readjustment, for all of us, due to the pandemic, we feel challenged to reorganize the Discipline, in order to mitigate the

challenges and difficulties faced by the new world scenario, social isolation. Our meetings on the Discipline that took place, in person, in the spaces of the University, began to take place through online meetings of no more than one and a half hours via webconference, and in the WhatsApp group, when we talked about the organization of the Discipline, as well as about the formative processes.

At all times we were wondering: how to promote an interactive online environment, in pandemic conditions? How can we make it possible to talk to students, and many have difficulties in accessing the Internet? How will we communicate synchronously and asynchronously? What movements in cartography can we make possible in order to observe each of the students? How to track student learning processes? Faced with so many challenges, it was not easy to arrive at a single strategy. After some meetings we were able to elaborate activities and recreate spaces in the AVA that could promote interaction synchronously and asynchronously among all those involved in the process.

Even so, with each synchronous or asynchronous meeting with the students, new challenges arose: from internet access, communication, interaction in the environment, insertion of files or production of files, which led us to seek alternatives to promote a recurring conversation with students and between them. It was decided in higher instances of the University that synchronous meetings would not be mandatory, as we would not be able to guarantee access for all students from their place of residence. At times, we felt alone since, weekly we were online so that students could dialogue with us and thus answer their doubts, and few were present. Most of the students were present asynchronously performing the activities in the environment and interacting with the Group of the Discipline through WhatsApp.

When we realize the lack of interaction and return to activities by some students, we made available, at the end of the first topic of the Discipline, we



developed a self-assessment (Figure 4), as a strategy for the student to return to himself and reflect on his performance in the Discipline.

### Self-assessment

Dear student;

**SELF-EVALUATING presupposes looking at you in the face of processes in which we can always improve... It's a revisit yourself...**

When we think about the evaluation in process, we invite you to reflect on your participation in relation to the activities, until then, developed in Topic I. For this, we raise some questions that should NOT be answered one by one, but in an understanding, quite briefly, of how you perceive yourself in these movements:

How did I carry out the proposed activities? Was I punctual and responsible? I developed with pleasure? Did I take it with deserved dedication? How committed have I committed myself? Did I participate in the chat meetings? Have I tried to overcome my difficulties?

**SELF-ASSESSMENT**

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Source: The Authors (2020)

We felt as we experienced and followed the teaching and learning processes needed to be adjusted in the next topics. We then revisited the self-assessments and reworked the next topics of the Discipline.

Throughout our planning meetings, we try to provide a specific time to talk about the progress of the Discipline and a moment of conversation with our students. However, not everyone observed and understood our proposal and space of interaction, as we can see in the speech of Student A " I was not participating much in chats, I always follow everything by the ava platform" and also in the speech of Student B " As for participation in the chat, I always understood that it should be to ask questions and used this resource only once to seek guidance on how to proceed to participate in the forum of the AVA."

Online teaching has challenged us to rethink how to conduct the Disciplines and thus become more sensitive to the realities of students, putting us in the place of the other as Maturana (2014) suggests. We can perceive such complexity factors in student 3's speech "It's not being very

Easy to follow the activities the way I would like, I miss the classroom classes because I don't have much affinity with virtual classes and I can't express myself the way I'd like to feel more inhibited." As we can see the first difficulty signaled by Student 3 is in following the virtual classes, that is, it is not used to online teaching, but with face-to-face teaching and feels inhibited.

Social issues were also present as can be perceived in the speech of Student 3: "(...) and I still share a computer with my daughter that ends up limiting our time of use or we end up using the cell phone (I do not consider the ideal way for readings) ". In the section, in addition to the social issue we can perceive the technological issue, strongly present in the speech "(...) using the mobile phone (I don't consider it the ideal way for readings) ". The management of these and other issues have influenced the modes of organization in online teaching, as well as issues of family organization and, consequently, the learning processes in times of COVID-19.

Throughout the Discipline offered online, we are, at times, face the emotional and personal outburst, caused by the moment we were experiencing and that we still experienced. According to Maturana (2014) are the emotions that guide our actions, it is the emotions present in a domain of action that determine a conversation, so it is the emotions that generate the way of teaching and learning in a learning environment. We try to encourage students to work on their difficulties, always welcoming their demands and talking about them.

## **Evaluation Dynamics**

Learning assessment requires attention, dedication and commitment. Fernando Becker (2001) and Humberto Maturana (2014) suggest us to validate the knowledge of the student and teacher, as agents of knowledge, look at the ongoing processes, and understand that at all times we change our thinking and our way of evaluating; therefore, in the Discipline, we try to evaluate each stage, every opportunity that the students had.

To follow the learning process of the students, in 2019, each of us teachers evaluated and remained in interaction with 26 or 27 students. Thus, the activities performed by the students were analyzed and commented, first, by one of the teachers, and, in a second moment, discussed by all teachers and, later, shared with the students. In 2020, as the smallest number of students, this division was not necessary. Therefore, we all interact with all students and their assessments.

During the period of the Discipline, we tried to contribute to the development of writing, orality, reflection and argumentation about the concepts addressed. We elaborate activities in the different topics that make up the Disciplines seeking the engendering between them. In the topic in which we discuss Innovation, in relation to School Mathematics, we seek to talk in forums about the different compressions of students and deepen the subject by reading texts and reflection on videos leading to the production of a creative lesson planning, which was presented through the production of slides and explanatory audios. In the topic in which we talked about teacher professionalization, we proposed that students access a video and an interview, and after a study, prepare a brief text presenting the understandings about the professionalization of mathematics teachers in Brazil. Relating innovation and understanding that it happens through the professionalization process that occurs in the initial and continuous training of teachers, was our proposal with the elaborated activities.

In the third topic of the Discipline, we suggest the studies of texts and research available, digitally, in the annals of events and in databases in the area of Mathematics Education in which students chose their reading and shared by writing their understandings. This topic sought to present and problematize what has been published and produced in this area.

Inclusive Education was the last subject studied in the Discipline in which we initially proposed a connection in and with Inclusive Education with a mix of testimonials, lives, films and text that were giving support for

discussion in forums. To finish the topic and also, the Discipline we focused on a conversation about being a mathematics teacher in an Inclusive Education and on a plan of mathematics classes in which students placed themselves in the position of teachers, considered innovation and inclusion. It was this coordinated set of actions that made it possible to emerge as a teacher in and by planning.

In all topics the activities were evaluated, we tried to validate the processes of knowledge construction of the undergraduates based on the criteria previously established, because according to Maturana (2014) there are criteria for validation of the explanations that depend on another observer, in the case of the Discipline, 'the observers' were the teachers immersed in the process of evaluating the learning of their students.

We organized and agreed with the students, from the beginning of the Discipline, some evaluation criteria, so that we could follow the activities, criteria that could be changed according to the teachers and students. Among the agreed criteria, we highlight: punctuality in the delivery of tasks; presence of identification data; formatting in the material; textual or oral coherence; interaction in the forums and clarity in conceptual argumentation in a way that shows the relationship with the material consulted and studied. Agreeing criteria allows co-responsibility for learning between teachers and students.

Textual writings, PodQuests, videos, presentations, interactions and articulation between these elements showed the learning of each student. Thus, in addition to the opinions that qualitatively expressed the evaluation of the activities, we built a table in which we recorded the grades attributed to each activity of each student so that at the end of the bimester we had a grade and, at the end of the semester, their average of the two bimesters. This record was necessary since this is the evaluation system at the University.

## Some considerations

In this study we report the experiences we experienced in the process of monitoring and validating the learning, in coordinated actions, of the students enrolled in the discipline of Mathematics Education and Teaching III, of the Undergraduate Mathematics course, in which we understand our co-creation from the emergencies in living in this Discipline.

This experience reaffirms the preemance in observing and updating, always, the evaluation processes in coherence with the Discipline, the class and the context. In addition, establishing the evaluation criteria, together with the students, makes them co-responsible for their knowledge and knowledge. The choices of resources, methods and evaluative criteria can be constructed and updated in the discipline's journey, enabling the resignify, teaching and learning online.

From the beginning of the Discipline, we knew that it would require dedication, commitment, time for planning, creation of teaching activities and evaluation of actions coordinated by co-writing. Therefore, we emphasize that the availability of online and face-to-face schedules, as well as the weekly meetings between us, were founding for the creation of a conversation in order to establish actions in cooperation.

Even with the restricted demand of students in the hours of the presence and synchronous meetings, through chats, we understand that, being available, face-to-face and online, we provide support and willingness to contribute to the student. In addition, we observed that the little demand occurred, because the culture of talking to the teacher in different ways and times is still under construction.

Given our educational, social and personal dispositions, we realized that shared and cooperative teaching enriched the students' learning process and brought to teachers a (re)create of activities, dynamics and alternatives of procedural evaluations that enabled, to all involved in the process, the resumption and complexification of concepts and arguments.

The coordinated actions, under these conditions, corroborated the density and gradual production of arguments related to the themes we studied, which we perceived by monitoring the activities and by the emergence of an innovative and inclusive teacher in the planning of mathematics classes.

In this movement of acceptance and validation of the knowledge and knowledge experienced by the students, in the course of the Discipline, we direct our views to dialogue, experiences in interactions, writing and orality, as processes of evaluation of teaching and learning with and in coordinated actions in the context of online education, which invites us to experience other processes.

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Received in August 2021.

Approved June 2022.