

## CLASS PLANS AND MATH EDUCATION: WHAT DID THE COVID-19 PANDEMIC TEACH US?

PLANES DE CLASES Y EDUCACIÓN MATEMÁTICA: ¿QUÉ NOS ENSEÑÓ LA PANDEMIA DEL COVID-19?

PLANOS DE AULA E A EDUCAÇÃO MATEMÁTICA: O QUE A PANDEMIA DA COVID-19 NOS ENSINOU?

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**Manuscript received on:** September 22, 2022.

**Approved on:** April 2, 2023.

**Published on:** June 02, 2023.

### Abstract

Math Education has, in recent years, been gaining ground in the production of scientific knowledge, as well as in its constant updating in the educational process. Investigating the ways, procedures, methods, and techniques through which pedagogue teachers, in the early years, teach Mathematics, is characterized by the construction of a theoretical-methodological framework with which each group of teachers or teaching network studied the evidence, contributing to the general and localized understanding of the intrinsic aspects of those, as well as the formulation of new proposals for the development of educational devices that excel in the quality of learning as well as the teaching process. In this way, this article aims to present a case study developed with five pedagogues' teachers, working in five different municipal education networks in the State of São Paulo, about their understanding of the planning and evaluation necessary during and after the pandemic period, evidenced by the lesson plans produced in a continuing education course in 2020. Therefore, as an analysis methodology, we used the discourse analysis proposed by the French perspective, which allowed us to investigate the ideological bases of the discursive formations on the above-mentioned conceptions and, enunciated by the studied teachers in their written speeches. As a result, this study evidenced (i) categorical enunciation of evaluative forms during the pandemic period, (ii) use of the constructivist teaching perspective as an ideological basis for teaching, (iii) lack of procedural description of the methodological and evaluative devices for the process of planned teaching.

**Keywords:** Pedagogue; Elementary education; Lesson plans; Math education; Pandemic.

### Resumen

La Educación Matemática ha ido ganando terreno en los últimos años en la producción de conocimiento científico, así como en su constante actualización en el proceso educativo. Investigar los métodos y técnicas a través de los cuales los docentes pedagogos, en los primeros años se caracteriza por la construcción de un marco teórico-metodológico con el cual cada grupo de docentes o red docente estudió las evidencias, contribuyendo a la comprensión general y localizada de los aspectos intrínsecos de aquéllos. De esta forma, este artículo tiene como objetivo presentar un estudio de caso desarrollado con cinco profesores pedagogos, que actúan en cinco redes municipales de educación diferentes en el Estado de São Paulo,

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sobre su comprensión de la planificación y evaluación necesarias durante el período de pandemia, evidenciado por los planes de lecciones producidos durante un curso de educación continua en 2020. Por lo tanto, como metodología de análisis, utilizamos el análisis del discurso propuesto por la perspectiva francesa, que nos permitió investigar las bases ideológicas de las formaciones discursivas sobre las concepciones mencionadas y, enunciadas por los profesores estudiados en sus discursos escritos. Como resultado, este estudio evidenció (i) enunciación categórica de formas evaluativas durante el período de la pandemia, (ii) uso de la perspectiva didáctica constructivista como base ideológica para la enseñanza, (iii) falta de descripción procedimental de los dispositivos metodológicos y evaluativos para el proceso de enseñanza planificada.

**Palabras-clave:** Pedagogo; Educación básica; Planes de lecciones; Educación Matemática; Pandemia.

### Resumo

A Educação Matemática vem, nos últimos anos, ganhando espaço na produção de conhecimento científico, bem como na sua constante atualização no processo educacional. Investigar os procedimentos, métodos e técnicas por meio dos quais os professores pedagogos, nos Anos Iniciais do Ensino Fundamental ensinam Matemática caracteriza-se pela construção de um quadro teórico-metodológico com que cada grupo de professores ou rede de ensino estudados evidenciam, contribuindo para a compreensão geral e localizada dos aspectos intrínsecos àqueles, bem como a formulação de novas propostas para o desenvolvimento de dispositivos educacionais que primem pela qualidade da aprendizagem como, também, do processo de ensino. Desta forma, este artigo possui por objetivo apresentar um estudo de caso desenvolvido com cinco professores pedagogos, atuantes em cinco diferentes redes municipais de ensino do Estado de São Paulo, acerca da sua compreensão sobre o planejamento e a avaliação necessários durante o período pandêmico, evidenciados pelos planos de aula produzidos em um curso de formação continuada ao longo de 2020. Para tanto, como metodologia de análise, utilizamo-nos da análise do discurso proposta pela perspectiva francesa, a qual possibilitou-nos investigar as bases ideológicas das formações discursivas sobre as concepções acima mencionadas e, enunciadas pelos professores estudados em seus discursos escritos. Como resultados, este estudo evidenciou (i) enunciação categórica de formas avaliativas durante o período pandêmico, (ii) utilização da perspectiva de ensino construtivista como base ideológica para atuação docente, (iii) ausência de descrição procedimental dos dispositivos metodológicos e avaliativos para o processo de ensino planejado.

**Palavras-chave:** Pedagogo; Educação básica; Planos de aula; Educação Matemática; Pandemia.

### Introduction

The change in educational paradigm that we are experiencing since the beginning of the COVID-19 pandemic that affected the entire planet in 2020 is notorious. Before, we had an education predominantly focused on the development of face-to-face classes, in a delimited physical space, and with a fixed time interval. With the need for social distancing, as one of the protective measures against the

spread of the virus that causes Covid-19, the adaptation of a physical school, with a rigid and defined structure at the time, to a virtual school, was urgent, as highlighted by Castro et al (2021) and Ferreira and Roldão (2023).

In this way, that classroom with desks, lockers, and a blackboard was replaced by a virtual environment for videoconferences, which require the cameras of each computer, audio, and a chat as a means of interaction. The sound signal, which was configured as a triggering device for disciplines and changes in pedagogical procedures, at school, was replaced by a family warning, that is, each family became responsible for the break time, for their sons and daughters, as well as how he was responsible for verifying the provision of adequate food, which was previously the choice of the school lunch menu and canteens.

In addition, the walls of the physical school were replaced by network connections, which held together not only the group of this or that class but also allowed any student, in any location on the globe, to interact with others belonging to distinct groups.

In this sense, it is undeniable that the pandemic that spread through 2020 raised, in the educational field, a sense of urgency for teachers, administrators, students, and parents. This urgency reflects the need, already prior to the pandemic and now clear, to redefine the school, the pedagogical work of teachers, the role of the student, and - why not? - the role of the school in contemporary times. In view of this, new questions have arisen for educational research, considering the digital universe as a naturalized context for obtaining data and analysis.

Moreover, this redefinition movement must encompass teacher training, considering a digitized and transmedia universe, the psychological and ontological aspects of subjects belonging to this new world, the contents produced and made available to students, school management models, and the objectives of education for this new humanity, characterized as digital.

In this regard, according to Rigal (2000, p.188) this “other school” is consistent with the development and establishment of a new cultural policy that adjusts the introduction, preparation, and legitimation of forms of social life. However, the author, in affirming such conformity, did not count on the abrupt transformation of society in such an abbreviated period.

In this way, we can add to the author's assertion that forms of social life were configured with the emergence of a virtualization of relationships within a group, that is, the *avatarization* of the self as a virtual subject. Regarding this concept, it is worth highlighting the construction of the self by contemporary society, because I am what the other in the network constructs of me, thus the virtual context is characterized by the social context. Thus, we can say that virtual socialization operators determine psychosocial aspects<sup>2</sup>.

Following the perspective of this new school that emerges from digital humanity, questions arise such as: what will be the necessary contents for the pedagogical work? What will be the norms for social interaction in a virtualized context? Taking Mathematics Education as the context of analysis, what are the necessary techniques for the development of mathematical knowledge, for example, in the early years? Finally, what should be the understanding of the aspects related to the objective of the lesson, teaching methodology, didactic content, and evaluation, that the teacher of this new humanity should have?

Such questions led us to propose this work, which aims to present a case study conducted with pedagogical teachers working in the early years of elementary school about their understanding of the planning and evaluation necessary for the pandemic period, as well as the ideological elements that base them. For that, we used the sociocultural theoretical contributions of Sewell Jr. (2005), Giddens (2013), and Benedict (2013), as well as the methodological supports contemplated by the discursive analysis of Pêcheux (2014;2015).

## Theoretical aspects

- Sociocultural aspects and teaching practice

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<sup>2</sup> An operator is defined as a set of actions intrinsically related to the sociological term highlighted. Thus, if we speak of a cultural operator, we want to refer to all actions that refer to the culture of a given social group.

Initially, we have as a pedagogical practice the mobilization of systematized knowledge, methodologically organized and with the purpose of guaranteeing the learning process in the subjects involved (MOMETTI, 2021, p.11). In addition to the mobilization and systematization of knowledge, it is important to highlight the teacher's intention throughout all his/her pedagogical work.

In this sense, the methodological choices, the set of knowledge that will be worked on in the students, as well as the assessment processes have, among themselves, a cohesive logical relationship, guaranteed by the teacher's intentionality. In addition to a drastic statement, regarding the topic at hand in this article, there will not be, within the teaching process, when viewed in its entirety, exemption of intention on the part of the teacher.

The teaching practice is characterized as one of the forms of social relationships established between individuals belonging to a specific group. Thus, when we consider the essential elements for the socialization and integration of subjects as constant in each society, the points of interaction end up operating as a “social glue”. When we deal with the context of pedagogical practice, the figure incorporated by the teacher materializes this “glue” through the transfer of traditions and social standards of that specific group.

Moreover, if there is an intention on the part of the teacher there will be, in a way, aspects of an ideological and cultural nature. For if the teacher is, before the professional subject, a social being, he will have culture as a historical contribution to his own existence, as highlighted by Ortega y Gasset (2011) when emphasizing that the difference between man and the rest of nature reigns in capacity, of the first, of the production of culture.

Thus, according to the same author, we have:

Tuttavia, la differenza decisiva tra l'animale e l'uomo non consiste tanto in quella che si ricava anzitutto comparando i suoi meccanismi psichici, ma nei risultati che questa differenza primaria comporta e che dà all'esistenza dell'animale una struttura completamente diversa da quella umana. Se l'animale ha poca immaginazione, sarà incapace di formarsi un progetto di vita diverso dalla mera reiterazione di ciò che ha fatto fino a quel momento, e basta questo per differenziare radicalmente la realtà vitale di uno dall'altro ente. Ma se la vita non è la realizzazione di un progetto, l'intelligenza si

trasforma in una funzione puramente meccanica, senza disciplina né orientamento (ORTEGA Y GASSET, 2011, p.151).<sup>3</sup>

In this way, the junction between intentionality, and culture materialized through experience, history, and both theoretical and methodological knowledge from the perspective of Tardif (2012), configures what we understand by teaching pedagogical practice.

By intentionality we understand the notion brought by Abbagnano (2018, p.662) that refers to any human activity or object other than it, alluding to a practical activity desired by the subject. Assuming this subject as the teacher, we can consider that his intention is to promote the teaching process to reach the student's learning. It should be noted, however, that without intentionality there will be no objectification of pedagogical practice.

Regarding culture, a recurrent and fundamental concept for this article, we understand it as the set of action schemes and resources through which values, beliefs, practices, and social behaviors are transported and disseminated among individuals. of a certain social group (SEWELL Jr., 2005).

In this perspective, cultural understanding starts from the concepts of action schemes and resources. Within the structuralist perspective advocated by Giddens (2013), every social body is formed by structures, which comprise institutions and sub-institutions. These structures are related to another essential element that constitutes society: human agency<sup>4</sup>.

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<sup>3</sup> However, the decisive difference between the animal and the Man does not consist in comparing their psychic mechanisms, but in the results that this primary difference entails and gives to the existence of the animal a structure completely different from that of the human one. If the animal has little imagination, it will be unable to establish a life project other than the mere reiteration of what it has done up to that moment, and this point alone already satisfies the radical difference between the vital reality of one and the other. But if life is not the realization of a project, intelligence becomes a purely mechanical function, without discipline or direction.

<sup>4</sup> On this point, we can mention, for example, the social institution of marriage. Understood in many social groups as a mechanism for uniting micro-groups to maintain power in social relations, or simply as a mechanism for maintaining their reproducibility and existence. Thus, when rules are configured, through laws, established from an ethical point of view, that is, collective, the institution will undergo considerable transformations in its structure, being able to crack or transform itself into another institution. A second example that beautifully illustrates the relationship between agency and structure is the historical moment of the French Revolution, in 1789. Social mobilization caused power structures to be totally imploded, generating a second structure characterized by the first moment of the republic.

Therefore, every individual – or collective – practice mobilized within a social group will exert influences that forge the structure, in the same way, that the structures themselves – represented through institutions and substitutions – forge the behavior and actions of the subjects that are part of it.

In fact, considering the school as a social institution, the individuals who are part of it, such as students, teachers, managers, and the administrative and support staff, modify it to the extent that their agencies manifest movements of change. As mentioned, if culture has a structural basis, we can say that from the perspective of Sewell Jr. (2005) and Giddens (2013), action schemes and resources are necessary constituents for the relationship established between teachers and students within the school institution.

In this way, we understand by action schemes the set of practices, modes, methods, and forms used by individuals within a structure. Such schemes can also operate through rules constructed – vertically or horizontally – by social grouping.

Resources, in turn, are characterized by the tools necessary for the use of schemes, in the case of non-human resources. In a complementary way, we can also have human resources, such as those individuals who occupy positions and guide the normative process, whether it is focused on production or order, within the structure.

Given the above, we can say that the school is an institution – made up of structures, culture being one of them – in which the individuals belonging to it are characterized by social microworlds with their own cultures. This means that each student within a classroom, for example, acts as an individual culture that is built in their social environment, throughout their history and experience. When together with his classmates, he will make a movement of cultural interaction that, in turn, will result in a transformation and, concomitantly, a reproduction of values, beliefs, and behavioral patterns.

Thus, the same will happen with the teacher since he will also be interacting with his students and will undergo a process of reproduction and cultural transformation. Therefore, the pedagogical practice is characterized by a social interaction through which there will be cultural reproduction and transformation.

Taking the concepts of action schemes and resources, according to Sewell Jr. (2005), we can say that in pedagogical practice, the former is characterized by the didactic methods and pathways that the teacher uses to develop his/her pedagogical work. The second, in turn, is characterized by didactic materials, virtual learning objects, electronic devices, as well as pedagogical documents such as lesson plans, teaching plans, and learning reports.

The presence of cultural devices in pedagogical practice, therefore, gives the teaching process a fundamental responsibility regarding the formation of the subject, as expected from the school institution.

### - Lesson planning in Math Education

The teacher's pedagogical planning is one of the most important points regarding the teaching process. When a teacher is available to plan, he dedicates his time to anticipate part of a future that is yet to come. Imagine how the development of a class would be, about a certain theme, if the methodological choice you made contemplates the contents to be taught, as well as if the evaluation thought is coherent with what you will develop during your class.

In this way, planning a lesson is preparing to develop a pedagogical work that may, as it often happens, not be processed in the way you thought. How many classes have we planned and, at the end of them, we realize that a part of it, or all of it, has been modified? This fact is what characterizes the dynamism of teaching work.

However, as mentioned, planning is a moment in which we perform the action of anticipating moments, imagining episodes, and designating other sets of attitudes of a future that has not yet happened, as highlighted by Cavalcante, Carneiro, and Silva (2012). This anticipation takes place, in a way, on a pre-established project. This means that the act of planning is an a priori movement in the teaching process.



Thus, if we think of a first-degree equations class, we must establish reference connections with the historicity and the lived experience, all the possibilities - positive or negative - that involved the development of this content in the classroom, be it physical or, as the moment of the pandemic required us, a virtual classroom.

Moreover, according to Zabala (1998), we can categorize teaching planning in the following aspects: (i) certainty of where one wants to go, (ii) recurrence of the teaching experience, (iii) understanding of didactic contents, (iv) choice methodological intrinsic to the contents and (v) choice of the assessment process consistent with the objective.

In the first aspect mentioned, the intentional role that every class must have been perceived. At this point, we corroborate Franco's (2015) ideas about the differentiation between teaching pedagogical work, defined as practice, and any other process of transmission of written oral, or behavioral culture. Thus, what guarantees the teaching pedagogical work is precisely the presence of intentionality at the beginning, middle, and end of the process, that is, an objective of developing the contents proposed by Coll (1992), which are classified as conceptual, procedural, and attitudinal.

The second aspect is what makes the teaching practice, as well as every existing pedagogical relationship in the classroom, consisting of social interaction. Because, when a teacher plans his class, he resorts to what he has already developed or worked on those contents, that is, he makes use of his history and the incorporated teaching culture, as discussed by Tardif (2012).

At this point, moreover, both the teacher and the student are subjects who produce history within a considered time interval and, therefore, are social agents that, in the perspectives of Giddens (2013), Sewell Jr. (2005), and Benedict (2013) produce cultures. It is through the reproduction of these cultures, transmitted in speech (discourses), behavior (habits), and the historical record of human production (didactic materials, cloud content, pedagogical documents, etc.) that the educating subjects receive the values and beliefs of a body social, transforming them according to the cultural influences coming from other spaces.

Still, on historicity, it should be noted that with the emergence of a new humanity, characterized by Mometti (2021) as digital, the production of culture has become more fragmented and open, which means the insertion of multiple and diversified values both in the language of the so-called digital natives, as in their forms of registration. For this reason, classes planned for 21st-century students will have to consider aspects related to digital didactics.

About the third aspect, it is worth highlighting the need for teaching knowledge to promote pedagogical work, as indicated by Tardif (2012). However, in the case of digital humanity, composed of digital natives, the teacher must use a new type of knowledge, here named mediatized.

Mediatized knowledge is characterized by the set of skills that the teacher incorporates and makes available, for handling, interpreting, and transforming their pedagogical practice through digital means, the necessary contents to be worked on. In this way, the pedagogical planning must contain - and, after the pandemic period in which the world was placed from the end of 2019 - aspects that materialize the mediated teaching knowledge, such as digital content, digital teaching materials and forms of development of the learning, also digital.

So, on the third aspect, it should be noted that, in the perspective adopted here, we understand by content the set of data, skills, modes, procedures, speeches, forms, about a certain discipline, elements that are distributed at the conceptual, procedural, and attitudinal levels, according to highlights Coll et al. (1992) and Coll (1997). In addition to these three levels, we added a fourth, characterized as virtualizing, which refers to knowledge that is transformed from the real world to the digital one, in a kind of "avatarization" of knowledge learned and incorporated by the senses, and transformed and interpreted by cognition.

Following the aspects, the methodological choice intrinsic to the contents must be conducted by the teacher through the recurrence of experiential, theoretical, and mediated knowledge. This means that the "how to do it" - concerning the methodological aspect of the teaching process - depends on the experience incorporated together with the skills already developed by the teacher regarding those intended contents.

Metaphorically, when we are going to learn how to make a cake, we strategically and systematically follow the chosen recipe. We calculate, exactly, the amounts of the ingredients, we use the equipment described in a reliable way, and the cooking time must necessarily be the same as stated in the recipe. However, this first time we did not pay attention to the fact that there may be physical and environmental conditions that interfere with the result, which is the desired cake.

In this way, it may be that on that day the gas is "ending" and, therefore, the heat produced inside the oven is not enough to bake the cake. Or, more unexpectedly, the butter we use for the recipe may be past the expiration date considered suitable for consumption, resulting in a more pasty and oily cake, which was not foreseen in the recipe.

Analogously, thinking about a class is like thinking about making a cake, and keeping the proper proportions. Of course, we are not saying that a student is predictable, as food is, but the procedures to develop the teaching process can be. Following the metaphor of the cake, the second time we are going to check the gas, we are going to check the validity of the butter. In the second class, we are going to change this or that method, we are going to add or exclude some extra exercises, we are going to choose this or that book, text, video, podcast, etc.

It is noted, therefore, that the methodological choice depends on the experience experienced. This fact was verified, for example, in one of the surveys we conducted with interns from the Physics degree course at the University of São Paulo, São Paulo. During a mandatory curricular subject in which trainee students should develop their activities in public high schools, we proposed the use of a different methodology to work on the chosen content.

This methodology, as highlighted by the trainees themselves in their final reports, and analyzed by Mometti (2019), was unknown and, therefore, caused insecurity in the development of classes with high school students. As the interns did not have the incorporated experience of teaching work with that methodology, their choice ensured the pursuit of the class through a manual style, that is, the recipe for the cake without considering the environmental aspects and other variables of the process.

Along the same lines, during a continuing education course focused on Mathematics Education throughout 2019, an activity foreseen in the schedule of another survey conducted with pedagogical teachers in the municipality of São Paulo, we discussed different methods for working with the decimal numbering system (DNS) in the early years. At the end of the course, two of the fourteen professors asked us if the ways they had been using until then to teach were “wrong,” and if they should necessarily use the methods presented in the course, as they had many difficulties in studying new approaches to mathematics (MOMETTI, 2020b).

In this sense, according to Zabala (1998), the methodological choice influences the last-mentioned aspect, inherent to the planning of the class: the adequate choice of the measurement process. Here, we have a pedagogical consideration of extreme importance regarding the teaching process. There is no right or wrong in the course of the pedagogical work, in a Manichean sense of the term. However, there are the most appropriate in terms of methodological choices for the development of the class.

Thus, it is very common to hear, in continuing education courses for teachers, the question “Is what I did correct?”, or “What is the correct way to teach first-degree equations?”, and even “What is the best way to work on the division in the early years?”, among others. However, the questions above should be asked as follows: “Is what I did suitable for my students?”, “What is the appropriate way to teach first-degree equations for this class, with these students, with these difficulties?” and “What is the most appropriate way to work with the division in the early years, considering the context in which my students are inserted?”.

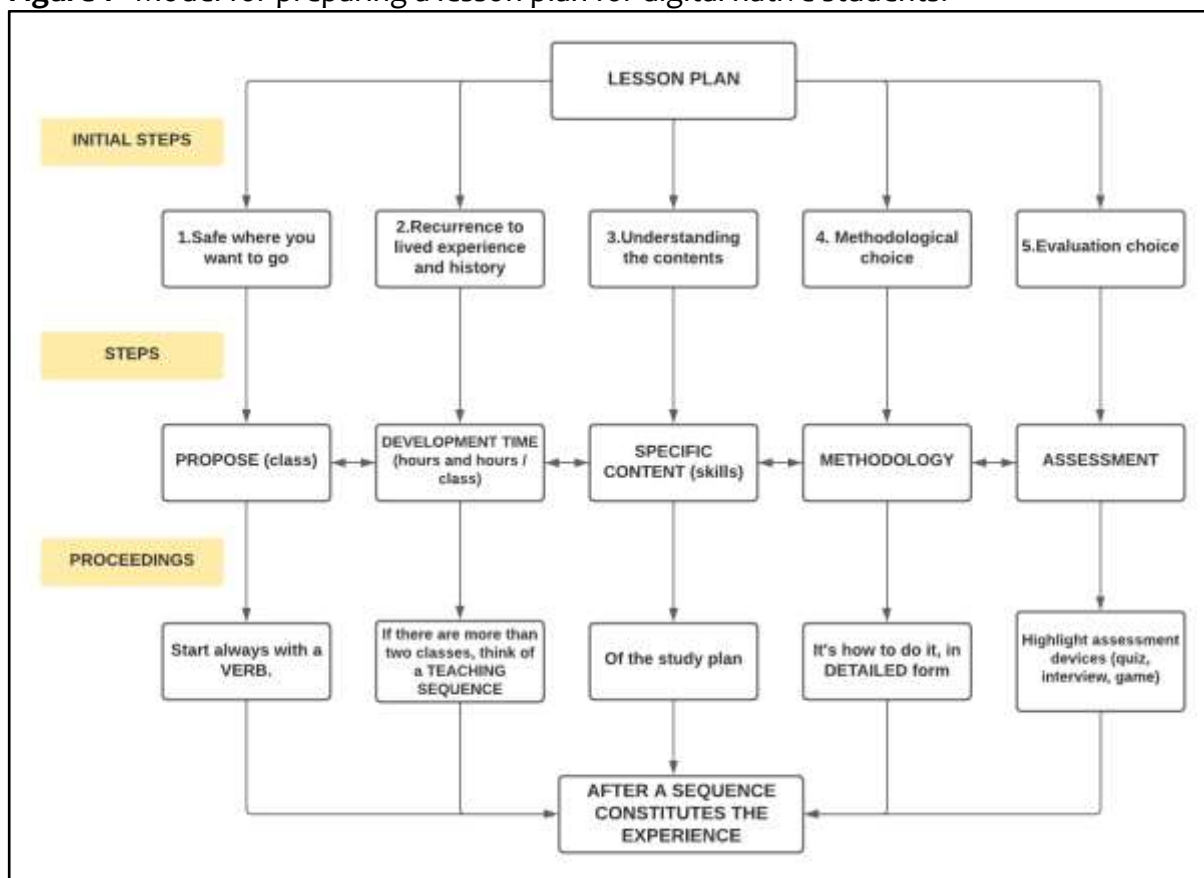
In this sense, it is noted that when we work with the idea of “the most appropriate” we start to consider not the generalization of students as if they were all the same, but the particularities of each one. This, without reservation, should be considered when planning a lesson. Therefore, we usually defend, both in teacher training courses and in academic and dissemination writings, that each class is a class, each student is a student, and each procedure may be suitable for one and not for another.

Based on this conception and, according to the perspective of Zabala (1998), the choice of the assessment process of process must follow the initially highlighted objective, the resources available for the development of the classes, the chosen methodology, and the time destined for its studies. Therefore, the debate over "Shall we use summative or formative assessment?" it becomes displaced to "With this class, this objective, these resources, and the procedures we have chosen, what is the most appropriate evaluation?".

When this element is considered, the notion of competence, defended by Perrenoud (1997) and reinterpreted by Zabala and Arnau (2010), becomes feasible, and more likely to be developed and incorporated throughout the process.

Thus, the planning of a lesson - materialized in the pedagogical document defined as a lesson plan - for students characterized as digital natives can be built according to the model represented by Figure 1.

**Figure 1** - Model for preparing a lesson plan for digital native students.



Source: the author.

It should be noted that the topics brought up by the lesson plan model in Figure 1 were developed from the conceptions of digital humanity (MOMETTI, 2021) and the necessary points for the preparation of a document that expresses the teacher's planning. It can be adapted or reformulated, because, as mentioned, it is an appropriate model for the type of class we seek to develop with students called digital natives.

## Design Research

- Context of the study and sources of information

This work constitutes an integral part of a research project developed at the University of São Paulo, São Paulo, Brazil, during the period 2020. Thus, the preferred project aims to study the cultural aspects that influence the pedagogical practices of pedagogues during Mathematics classes.

In addition, its specific goals are: (i) to investigate the main methodological ways that polyvalent teachers use to teach mathematics in the early years, (ii) the cultural operators that influence the methodological choice in the early years, (iii) the mathematical concepts of greater difficulty for the pedagogical work and, finally, (iv) developing continuing education courses, as well as support materials for teaching practice with regard to teaching mathematics in the early years.

Thus, within the goals, one of the ways of proceeding with data collection was the proposition followed by the development of a continuing education course for teachers, conducted during the second half of 2020. Such teachers were invited through a public notice released in partnership with the municipalities, which recognized the importance of that training and integrated the certification obtained, as a requirement for accounting for the mandatory workload in the teaching career plan.

The continuing education course served us, therefore, as one of the means for building the sources of information, which were used in this article for this case study. Still, on the course, it was conducted online, over a period of four months, with a total workload of 60 hours distributed over twelve weeks, with synchronous remote classes, via a videoconference platform.

Furthermore, as a form of pedagogical support for its development, a virtual learning environment (VLE) was created, in which activities were inserted to be carried out during the week, such as reading recommendations, sending files, and participating in collaborative forums. All the activities developed by the professors throughout the course contributed to the constitution of the source of information for this study.

In this sense, the text in question is characterized by a case study, because according to Yin (2015, p.52) “as a research method, the case study is used in many situations, to contribute to our knowledge of the individual, group, organization, social, political and related phenomena”. In the context presented, we seek to know, understand, and inquire about a specific group of five pedagogical teachers, belonging to five municipal teaching networks in different municipalities in the State of São Paulo.

In this way, we selected the data produced from the source of information that gathered the lesson plans developed by the pedagogues in one of the proposed activities. Such activity was requested after the teaching of a class on the pedagogical documents lesson plan, teaching plan, and didactic sequence. As a second source of information, we highlight the recording of this synchronous moment, which followed the guidelines determined by Resolutions No. 466 of December 12, 2012, and No. 510 of April 7, 2016 (BRASIL, 2012; 2016), as well as the General Law of Personal Data Protection No. 13.709/2018 (BRASIL, 2018).

As the continuing education course was an integral part of the work schedule proposed for the aforementioned project, its didactic organization should contemplate aspects of interest for study and data collection around the desired objectives. Thus, its syllabus comprised four themes, which were: (i) *The Use of Symbols in Mathematics Education*, (ii) *Fraction Teaching Techniques*, (iii) *Multiplication Teaching Techniques*, and (iv) *Division Teaching Techniques*.

The first theme aimed to develop, together with the participating teachers, the general aspects concerning symbolic representations in mathematics, starting from their semiotic definitions, methods of use in the classroom of the early years, and, finally, forms of construction of documents pedagogical methods and their differentiation, highlighting lesson plans, teaching plans and didactic sequences. For this theme, we used studies in semiotics in Mathematics Education, conducted by Duval (2011).

The second theme aimed to deal with the teaching of fractions, starting from the elementary concept, interpretation techniques, comprehension techniques, and later, techniques for use in mathematical problems. In the third and fourth themes, in turn, the focus was on the techniques that the participating teachers already knew and on the characteristics that were most suitable for their work in the lesson.

#### Data transformation and analysis procedures

The analysis of the lesson plans was developed using two methodological contributions: (i) collection and organization of the lesson plans according to the guidelines established in Figure 1 followed by (ii) analysis of the discourse proposed by Pêcheux (2014; 2015).

About item (i) twenty-five shots were selected out of the fifty-six received by the virtual environment. As sub-criteria for selecting the analysis sample, the following were considered: (a) active participation of the teacher during remote classes and (b) presence in the class that dealt with lesson plans. Thus, after applying sub-criteria (a) and (b), five lesson plans were created for conducting the discourse analysis method.

Regarding the latter, its choice included the search for this study to understand what the pedagogical teachers expressed in their plans about possible methodological changes due to the new context imposed by the Covid-19 pandemic. In this way, the methodology proposed by Pêcheux (2014;2015) provides us with tools to search for ideological bases, from the discursive formations, which underlie the utterances, whether these are spoken or written.



In this sense, according to Pêcheux (2014), the discourse is formed by internal structures that allow, through the so-called discursive marks, access to a quantity of information that the enunciator does not always make explicit. Thus, Pêcheux (2014) uses the concept of the iceberg proposed by Sigmund Freud at the beginning of the 20th century to, analogously, say that the part to which we have access – the discursive surface – is the tip of the iceberg because the bases ideological foundations for that uttered speech are found below this surface.

Thus, through discursive marks – the words that mark the uttered discourse, we can have access to the ideological bases that underlie the enunciator's real understanding of the discursive theme developed. In this way, with the five selected lesson plans, a floating reading was conducted, in the first moment, for knowledge of the statements, and a first attempt to collect the discursive marks.

In a second moment and, in a systematic way, the discursive marks of the utterances, their discursive formations, and the discursive processes were highlighted to, finally, obtain the ideological formations that support the understanding of what polyvalent teachers understand about the evaluation in a plan of the classroom. All collected speeches, as well as their analysis, were organized in a table, for a better understanding of the process.

### **Data and discussion**

Table 1 presents the results of the discourse analysis performed on the statements of the five selected lesson plans. To maintain the secrecy of the subjects participating in this study, the names Alessandra, Beatriz, Cláudia, Diego, and Eduardo will be used here to refer to the statement and its interpretation, followed by discussion.

**Table 1** – Discursive analysis of lesson plans according to Pêcheux (2014;2015).

Teacher	Discursive surface	Discursive marks	Discursive objects	Discursive process	Ideological formation
Alessandra	Self-assessment (positive and negative points), to later provide feedback on these two reported points.	Self-assessment Feedback Reported points	Deal with the form of assessment that will be applied in the lesson plan.	Highlight the evaluation in its general sense and not regarding modes.	Constructivist view.
Beatriz	Observation of students' arguments and interactions during the game, as well as the student's own explanation of what he learned in the game. Carrying out another activity involving the same work concept in the game.	Observation Student Interactions Explanation of the student himself in relation to what he learned	Explain the form of evaluation that will be used at the end of the class.	Highlight what will be considered as a form of evaluation and highlight an assessment device.	Constructivist view.
Cláudia	The evaluation should be continuous, with observation of the level of participation and involvement in the proposed activity and student records	Must be continuous. Observation Participation Involvement Records	Deal with the evaluative form that will be used at the end of the mechanical class.	Highlight the type of evaluation that will be used based on the definition.	Constructivist view and experience as measured learning (Deweyan perspective)
Diego	Students will be evaluated all the time and through interventions, they will have opportunities to rethink their practices and show new advances.	Evaluated all the time. Will have opportunities. Rethink your practices. Show new advances	Deal with how the assessment will be conducted at the end of the planned class.	Mention that the evaluative form will be continuous and what this will allow at the end of the process.	Constructivist view.
Eduardo	As an evaluation, I will ask students to read the activity and use different strategies to conduct problem situations.	I will ask. Read the activity. use different strategies	Deal with the evaluation that will be requested at the end of the planned class.	It should be noted that the assessment should start from the strategies of the students themselves.	Constructivist view.

Source: Author, 2022.

In teacher Alessandra's speech, the words "self-assessment", "return" and "reported points" are noted as discursive marks. With the first, the teacher reveals in her speech the decentrality character of the teaching process, placing the student as a participating subject. In this way, letting them participate in their own assessment requires them to have the maturity of reflection to think about their development as a student, in addition to demanding discernment to separate what they liked from what they did not like.

Precisely on this last point, still in the evidenced speech, Alessandra puts her work under evaluation since the fact that the student lists what he liked and what he did not like will be about the ways in which the class was held. It should be noted, however, that this plan was designed for a third-year class in the early years and, therefore, the question of whether the student is mature enough to assess himself was not suggested.

In addition, self-assessment was an aspect considered during the pandemic period, as the change in basic assumptions from a physical school to a virtual one required student to be more autonomous and, therefore, more capable of knowing whether they were learning a certain content. In this way, self-assessment is foreseen by the teacher, in her lesson plan, in a methodological sense, not just the assessment.

As an ideological basis for the formulation of this discourse, it is clear, with the discursive formation, that the teacher understands education from the precepts established by the constructivist pedagogical approach which, according to Zabala (1998, p.63), is a pedagogical procedure characterized by a construction in which meaning can be attributed to a given teaching object, implying the contribution of an interlocutor.

In addition to this perspective, there is the idea, brought by Coll (1997), about students' learning being expressed through their behavior, reproduced from what is observed and which depends on their potential for analyzing the environment.

An interesting element that corroborates this analysis is the fact that Alessandra, during the synchronous moment in which we debated the lesson plan and the new needs for teaching brought about by the pandemic, brought some contributions to her period as a teaching student, emphasizing how much he liked the constructivist activities developed by his Didactics teacher.

Thus, as previously mentioned, we can perceive the presence of the cultural element as influencing teacher Alessandra's ideological base. Once there was the incorporation of the standards, values, and beliefs related to the constructivist perspective through her agency developed with the pedagogical practice in her time of service as a teacher.

In the same way as the previous statement, teacher Beatriz reveals in her speech the constructivist view, about what she understands, in this case, by evaluation. However, unlike the previous one, there is an allusion to how this assessment will be conducted, a fact that leads us to a suggestion, even if timid, of an alert for adaptation imposed by the pandemic period.

Thus, the main highlight of Beatriz's discursive surface is found in the "observation" mark, which gives us the interpretation that the teacher, through her own collection of information she deems pertinent, will make an evaluative analysis of the students, after the end the class proposed in your plan.

However, the criteria she will use in this observation, that is, which elements and/or characteristics will be observed, is not clear. Another interesting point, still about this speech, refers to the brand "explanation of the student in relation to what he learned". Here, his ideological formation is more than evident, as already mentioned, from the constructivist perspective, since such thinking is in line with the perspectives of Zabala (1998) and Coll (1997), that is, one of the main objectives of the perspective Constructivist is to develop in the student his autonomy. Only an autonomous student will be able to respond effectively to the discursive mark present in Professor Beatriz's speech.

The teacher Cláudia, in turn, makes it clear on the discursive surface considered that she understands the typology of assessment forms, but does not report the modus operandi on how she will carry it out. This interpretation of his statement collates with the data obtained from the five plans analyzed, since all of them presented only the names and characterizations of the evaluation, exempting themselves from a detailed description of how the "act of evaluating" would take place in a new context teaching imposed by the pandemic situation.

This means that the teacher has theoretical knowledge, obtained both in their initial and continuing training, as highlighted by Tardif (2012), however, it is limited to categorization and does not present a description of the evaluative devices<sup>5</sup> that will be used.

Another interesting point of the analyzed statement is in the ideological formation since it proved to be a junction between the constructivist perspectives - given by the mark's "observation", "participation" and "involvement" - and the Deweyan perspective<sup>6</sup>, focusing on the experience and its influences on the learning process.

It should be noted, at this point, that this teacher graduated over forty years ago in teaching and completed her training in Pedagogy 11 years ago, through the expansion project of distance learning courses and the mandatory specific training. In this sense, there are remnants of the pedagogical vision incorporated by culture, at the time of its first training (teaching), with pedagogical contributions that influenced Brazilian education from the 1970s onwards, and particularly that of the state of São Paulo, compared to with what Souza (2006) presents us.

Regarding the statement highlighted by Professor Diego, there is a reference to the typology of continuous assessment, as also mentioned by Professor Cláudia. In addition, it makes it clear that the evaluation has ramifications, which are given by the brands "will have opportunities", "rethink their practices" and "show new advances", which leads us to consider what Diego reveals in his speech a concern with the new paradigm introduced by the Covid-19 pandemic.

Furthermore, it is noticed that the teacher, when formulating this statement thinking about the evaluation that he will apply at the end of the planned class, did not consider the age group of the students, as well as whether they are mature for this self-analysis process. This element leads us to the interpretation that this discourse is a reproduction of the culture incorporated by the teacher throughout his training, both initial and experiential, since teacher Diego, at the time of the training course, had already been working as a pedagogue for five years, having graduated six years ago.

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<sup>5</sup> In this paper, we mean by assessment devices all the pedagogical instruments used as resources for assessment, such as objective questions, essay questions, game-based quizzes, production of texts, drawings, and any other product involving the student's autonomous work, around a specific topic.

<sup>6</sup> With this neologism we refer to the pedagogy of John Dewey.

In this way, even with the mandatory internship period conducted throughout their initial training, as collected by the enrollment form for the continuing education course, the pedagogical support used for the development of their teaching practice is still, essentially, theoretical as discussed by Tardif (2012).

However, ideological training highlights, like all the previous ones, a constructivist view of the process, which leads us to assume - also for future investigations - if the pedagogical training courses have theoretical-methodological contributions directed towards this specific conception, or if such a “vision” only represents an internalized culture that manifests itself only in the experience and sharing between professors.

Professor Eduardo, unlike the previous ones, makes it clear in his speech that the student himself must find his own strategies to solve what is proposed. In this way, it is clear to us, through the discursive process, that the ideological basis for his speech is the constructivist view, prioritizing the active student in his learning.

This teacher, during remote classes, proved to be very participatory and questioning about always placing the student as a liability, in the process and stated that in his pedagogical work, he always seeks to provide opportunities for his students to find their own ways to solve a certain situation. This was a point of fundamental importance that the situation of the Covid-19 pandemic brought us, because rethinking the role of the teacher, as well as that of the student, allows us to reconsider what works and what does not work in the educational process.

## Conclusions

In view of the results presented in the previous section, we noticed that the understanding of the planning, methodology, and evaluation of the teachers participating in the study was, in a certain way, categorical. This means that the statements highlighted the definitions and categories that did not have the presence of the technique and, mainly, for the conceptual definitions involving the procedures and measurement devices, such as those that would be used to carry out the evaluation, such as questionnaires, quizzes, games, etc., were not mentioned.

In a second moment, we observed, from the floating reading of the lesson plans sent to the virtual learning environment, in the selection phase of which ones would be used to conduct the discursive analysis, that 80% knew only some type of evaluation category, such as "ongoing", "in process" or "participatory". This data showed us that the pedagogical teachers participating in the continuing education course had incorporated, in their pedagogical practice, cultural elements that allude to the theoretical-methodological assumptions of constructivism, as a technical element for their practice.

This fact raises an open question emerging from the study in question: are the Pedagogy courses, in their methodological essence, based on this pedagogical conception? For, if we consider the conceptions of knowledge proposed by Tardif (2012), especially when referring to the transformation of academic knowledge into technical knowledge, we can infer that either the teacher learned the constructivist conception in his initial training process or conceived it through courses of continuing education and development of their own teaching experience among their peers.

Regarding this questioning, it is up to us to emphasize that it is not our objective to ponder the quality of this or that conception, but only to understand how the pedagogue teacher is formed in all its dimensions so that, in a second moment, we can think about the teaching process itself. and learning.

Furthermore, the results of the discourse analysis showed us that, despite having presented a model of lesson planning assuming digital humanity (consisting of digital natives) as a context, the teachers remained in the pedagogical perspective already incorporated, that of the analogical tradition - that is, that of the traditional classroom, with all students studying and learning at the same time, at the same pace, and having the same difficulties. This means that the secularity of incorporating methodological perspectives for a new type of student is still ongoing.

This fact leads us to a third conclusion, that the mediated knowledge was not understood and incorporated as necessary for the development of the pedagogical work by the teachers studied, which gives us an indication for the development of continuing education courses that highlights this theme as a guiding line, in addition to new research horizons.

In addition, as a result of the present study, we have an indication that, even in the face of the methodological rupture caused by the pandemic period in the teaching process, and perhaps even because of it, pedagogical teachers still need theoretical and methodological contributions to understand how the transposition of knowledge will be in this new digital humanity.

Finally, we point out that the results presented here are of paramount importance for the continuation of studies, reflecting on the formats of offers of the next continuing education courses for teachers, in addition to new typologies to produce knowledge and research regarding the area of Math Education in Brazil.

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