EDUR • Educação em Revista. 2021; 37:e223020
DOI: http://dx.doi.org/10.1590/0102-4698223020

ARTICLE

MESSAGES FROM PEDAGOGICAL PRACTICE IN TEXTS OF EDUCATIVE CURRICULUM MATERIALS: AN ANALYSIS FROM THE INTERACTIONAL DIMENSION

REINALDO FEIO LIMA[1;2;*]
ORCID: https://orcid.org/0000-0003-2038-7997

ANDRÉIA MARIA PEREIRA DE OLIVEIRA[1;3;**]
ORCID: https://orcid.org/0000-0002-8011-5179

ABSTRACT: The aim of this paper was to identify and characterize the variations in the message that occur in the interactional dimension, regarding the school pedagogical practice represented in the texts of the educative curriculum materials. We used the qualitative method and document analysis as a procedure. Basil Bernstein's theory was the theoretical-methodological framework, in particular, we used the concept of framing in the study. The results indicated that the geometry and algebra contents are noticeable, regarding *what* to teach and to *how* to teach, *the reproductive sequential use of the mathematical task*. Also based on the results, we identified that the message in texts of educative curriculum materials characterizes a strong control of the teacher in relation to the discursive rules, selection, sequencing, rhythm and evaluation criteria. There was a variation in control intensity, when teachers and students shared the resolution of the mathematical task. In addition, the teacher provided open communication and greater engagement to students during the teaching and learning processes.

Keywords: Messages, text, educative curriculum materials.

MENSAGENS DA PRÁTICA PEDAGÓGICA EM TEXTOS DE MATERIAIS CURRICULARES EDUCATIVOS: UMA ANÁLISE A PARTIR DA DIMENSÃO INTERACIONAL

[1] Universidade Federal da Bahia, Salvador, BA, Brasil
[2] Universidade Federal do Sul e Sudeste do Pará, Santana do Araguaia, PA, Brasil.
[3] Universidade Estadual de Feira de Santana, Feira de Santana, BA, Brasil
*Doutor em Educação pela Universidade Federal da Bahia (UFBA). Professor Adjunto da Área de Educação Matemática da Universidade Federal do Sul e Sudeste do Pará (UNIFESSPA). Santana do Araguaia, PA, Brasil. E-mail: reinaldo.lima@unifesspa.edu.br.
**Doutora em Ensino, Filosofia e História das Ciências pela Universidade Federal da Bahia (UFBA) e Universidade Estadual de Feira de Santana (UEFS). Professora Adjunta da Faculdade de Educação da Universidade Federal da Bahia, Professora Permanente do Programa de Pós-Graduação em Ensino, Filosofia e História das Ciências da UFBA/UEFS e do Programa de Pós-Graduação em Educação da UFBA. Salvador, BA, Brasil. E-mail: ampo@ufba.br

RESUMO: O objetivo deste artigo foi identificar e caracterizar as variações na mensagem que ocorrem na dimensão interacional, no que diz respeito à prática pedagógica escolar representada nos textos dos materiais curriculares educativos. Utilizamos o método qualitativo e a análise documental como procedimento. A teoria de Basil Bernstein foi o referencial teórico-metodológico, em especial, utilizamos o conceito de enquadramento no estudo. Os resultados obtidos indicaram que é perceptível a explicitação dos conteúdos de Geometria e Álgebra, no que se refere ao *que* ensinar e ao *como* ensinar, *o uso sequenciado reprodutivo da tarefa matemática*. Também com base nos resultados, identificamos que a mensagem em textos de materiais curriculares educativos caracteriza um forte controle do(a) professor(a) em relação às regras discursivas, seleção, sequenciamento, ritmagem e critérios de avaliação. Houve uma variação na intensidade do controle, quando professores e estudantes compartilharam a resolução da tarefa matemática. Além disso, o(a) professor(a) proporcionou uma comunicação aberta e um engajamento maior aos estudantes durante os processos de ensino e de aprendizagem.

Palavras-chave: Mensagens, texto, materiais curriculares educativos.

MENSAJES DE PRÁCTICA PEDAGÓGICA EN TEXTOS DE MATERIALES CURRICULARES EDUCATIVOS: UN ANÁLISIS DESDE LA DIMENSIÓN INTERACCIONAL

RESÚMEN: El propósito de este artículo fue identificar y caracterizar las variaciones en el mensaje que se dan en la dimensión interaccional, con respecto a la práctica pedagógica escolar representada en los textos de los materiales curriculares educativos. Utilizamos el método cualitativo y el análisis documental como procedimiento. La teoría de Basil Bernstein fue el marco teórico-metodológico, en particular, utilizamos el concepto de encuadre en el estudio. Los resultados obtenidos indicaron que se nota la explicación de los contenidos de Geometría y Álgebra, en cuanto a *qué* enseñar y *cómo* enseñar, *el uso reproductivo secuencial de la tarea matemática*. También con base en los resultados, identificamos que el mensaje en los textos de los materiales curriculares educativos caracteriza un fuerte control del docente en relación a las reglas discursivas, los criterios de selección, secuenciación, ritmo y evaluación. Hubo variación en la intensidad del control, cuando profesores y alumnos compartieron la resolución de la tarea matemática. Además, el docente brindó a los estudiantes una comunicación abierta y un mayor compromiso durante los procesos de enseñanza y aprendizaje.

Palabras clave: Mensajes, textos, materiales educativos curriculares.

INTRODUCTION

Educational Curriculum Materials (ECM[3]) have become an emerging field and referenced in international literature as a possibility to support teacher learning (BEYER; DAVIS, 2009; REMILLARD; HERBEL-EISENMANN; LLOYD, 2009; REMILLARD; KIM, 2017). According to Remillard (2018), the materials must "talk to" teachers about the ideas intrinsic to mathematical assignments and not just "guide" their actions. These materials must have educational elements for teachers in their structure (REMILLARD, 2018). Davis, Remillard and Kim (2017) support the argument that ECMs should enable teachers to develop new significant mathematical assignments and favor the understanding of mathematical concepts and processes (CYRINO; OLIVEIRA, 2016).

ECM are resources historically used to support the learning of teachers and students, as pointed out by Remillard and Kim (2017) and Remillard (2018), which consist of any physical or digital material - such as textbooks, handouts or activity books produced by the Municipal and State Educational Departments. This support may be given by the constituent elements of ECM, such as: guidance on student questions, student answers commented, videos of a class (NIE et al., 2013; AGUIAR; OLIVEIRA, 2014, 2017).

Research on ECM has been consolidated as an emerging field of research in the area of Mathematics Education, since studies in this field are focused on reflecting on what is taught and how it is taught with the materials. ECM are not only important for teachers - these make use of such materials in the classroom - but also for researchers in the field and evaluators. Therefore, this paper proposes a work that adds new elements to the current research framework.

The present study aims to investigate the message of pedagogical practice represented in ECM texts, elaborated by Observatory of Mathematical Education (OEM-Bahia), based in Federal University of Bahia (UFBA), by The Information and Communication Technologies Study and Research Group in Mathematical Education (GEPETICEM), from Federal Rural University of Rio de Janeiro (UFRRJ), and by the Research Group on the Formation of Teachers who Teach Mathematics (GEPEFOPEM), from the State University of Londrina (UEL).

The analysis of educational curriculum materials, in the specific case of Mathematical Education, can bring important reflections on what and how the contents are addressed in these materials: what refers to the contents that are the object of teaching and learning processes, and how it concerns the operational mode of these processes (MORAIS; NEVES; FERREIRA, 2019). Thus, in order to contribute to a better understanding of this theme, we developed the present study which aims to identify and characterize the variations in the message that occur in the interactional dimension concerning the pedagogical practice represented in the texts of the educational curriculum materials produced by groups linked to three higher education institutions. For that, we used some concepts from Basil Bernstein's Theory, following an interpretative approach.

In the next section, we present a discussion about some concepts of Bernstein's theory (2000) used in the study, which served for the methodological design and discussion of the data produced, covered in the following sections. Finally, in the sixth section, the final remarks are presented.

EDUCATIONAL CURRICULUM MATERIALS FROM THE BERNSTEINIAN PERSPECTIVE

The expression "Educational Curriculum Materials" is conceived as a set of pedagogical texts, made available for supporting both teacher and student learning (DAVIS; JANSSEN; DRIEL, 2017; REMILLARD; KIM, 2017). The term "educational" refers to teachers as apprentices and the expression "teacher learning" to changes in teacher participation patterns in his pedagogical practice. We understand participation pattern as regularity in the subject's participation and teacher learning, which can occur in different contexts, for example, the classroom, the school community, professional training courses (VILAS BOAS; BARBOSA, 2016; McNEILL et al., 2017).

In this research, under Bernstein's perspective (2000), "text" is any communicative act performed by someone, including pedagogical representation that is spoken, written, visual, spatial or expressed in posture. Bernstein (2000) broadly defines "pedagogical practice" as the relationship that can occur between parents and children, teachers and students, as well as between doctor and patient, among others, in a given social context, for cultural production and reproduction. We use the term "school" to denote the relationships established between teacher and students at school. Thus, in this study, we understand "school pedagogical practice" based on the relationship established between teachers and students to teach and learn content (OLIVEIRA, 2010), in particular, when working with educational curriculum materials in the classroom.

When attempting to identify and characterize the relationships between the subjects expressed in the ECM, we assume these contain texts capable of enabling communication with teachers through elements created to develop a certain mathematical content (AGUIAR; OLIVEIRA, 2017). Therefore, ECM can highlight (BERNSTEIN, 2003) some aspects related to the relationship between teachers and

students in the classroom, being configured as a means of communication through texts, ideas and pedagogical practices in the classroom.

When categorizing ECM as a set of pedagogical texts, we assume they represent more than static collections of mathematical assignments, lesson plans, students' written productions, theoretical orientations concerning methodological strategies and specific topics in Mathematics. They are made up of professional knowledge and represent a possibility to support the teacher learning through the experience (s) carried out by other teacher (s) (REMILLARD, 2018).

Some studies show the ways teachers use materials may vary (BEHM; LLOYD, 2009; BROW, 2009; REMILLARD, 2018). Brow (2009) presents five possible steps to be identified when teachers relate to ECM: selection of the material; material interpretation, both in planning and during implementation; reconcilement of the material with intended objectives; accommodation of students' interests, experiences and limitations; and, finally, the modification, which refers to when the teacher modifies the existing structures or omits parts that do not interest him in the material.

The relations teachers establish with ECM as a field of research in Mathematics Education make it possible to know the beliefs, concepts, learning, participations and values attributed by these professionals to the different levels of curriculum development (LIMA; JANUÁRIO; PIRES, 2016; CRISOTOMO; JANUÁRIO; LIMA, 2017).

In his study, Lima (2014) aimed to understand the relation between teachers and curriculum materials in the teaching of natural numbers and decimal numbering system. The results show that teachers relate to curriculum materials in pedagogical practices, sometimes reproducing, sometimes adapting, but rarely creating from what was proposed in them. In the studies of Pacheco (2015), in the same theoretical line as Lima (2014), the goal was to investigate how two teachers from the early years of São Paulo State Network were related to the specific curriculum materials from the set Space and Form of National Curriculum Parameters. Results show they used the curriculum materials in the same class differently - reproduction, adaptation and creation -, which were guided by the knowledge and conceptions of these professionals. Regarding adaptation and creation, however, the teachers' purposes not always coincided with the conceptual, didactic and methodological purposes of the Educational Curriculum Material.

In these two studies, both used the term Curriculum Material (CM). In this research, we consider both CMs and ECMs educational for their intention of promoting teacher learning and, consequently, student learning. In the studies developed by Lima (2014) and Pacheco (2015), the emphasis was on the relationship teachers established with ECM. In addition, they presented common characteristics, such as the contributions of Remillard and Brown and collaborators as theoretical foundation to situate and discuss the existing relation between teachers and materials, as well as the uses of educational curriculum materials by teachers, which can be classified as reproduction, adaptation and improvisation (BROWN, 2002, 2009).

Studies by Lima (2014) and Pacheco and Pires (2015) corroborate the ideas of McClain et al. (2009), when arguing that the way teachers use ECM is related to the way they consider the following factors, for example, discussion/reflection on the topic; curriculum program content; structure of the curriculum material; relationship between subjects in pedagogical practice and investigation of the problem situation (SILVA; BARBOSA; OLIVEIRA, 2013). Other factors were also identified in the research by Aguiar and Oliveira (2017), such as the aspects affecting the students' daily lives, questions of prescribed content and the lack of experience of students with investigative activities, factors that significantly contribute to the type of use of educational curriculum materials.

Based on the results of the studies, we maintain that ECM, as it represents a pedagogical relation, can express a message, an expectation of contextual realization, that is, what and how subjects are taught with school pedagogical practices based on texts from ECM. As texts, ECM also communicate about the school pedagogical practices to which they refer, thus presenting a message.

Bernstein (2000) uses the concepts of communicative context and code to explain the idea of message. For the author, the concept of "communicative context" refers to the environment in which the school pedagogical practice takes place. "Code" is a regulatory principle, tacitly acquired, which selects and integrates relevant meanings (for a given context); forms of realization (texts produced), and evocative contexts (classroom, training course, workshops, etc.). Therefore, one cannot teach a code to

anyone, because it is more learned than taught; it is inferred through speech and acquired the same way linguistic and grammatical codes are acquired. The "message", as the author points out, is produced by the control exercise each subject does during the communication process, i.e., the relationship between those who teach and those who learn, communicating the meanings of how to speak in the educational context.

In order to understand the communication relations that include, as a message, the relations of power and control in the school pedagogical practice in the texts of ECM, we resort to the concepts of classification and framing used by Bernstein (2000).

The "classification" principle reflects power relations and is used, according to Bernstein (2000), to examine the contents to be transmitted, that is, what can be said. Thus, classification can vary between strong and weak due to the isolation strength of the contents of communication relations. Classification defines the content of the communication within a given communicative context. When there is a clear separation of content, we have a strong classification.

In the school context, classification may be considered strong when the teacher of a certain subject, such as Mathematics, does not relate to the content of other school subjects, for example, Science or Geography, or he/she does not take into account the students' previous knowledge and doubts that are not related to the content covered in the classroom. Thus, the teacher does not allow students to establish connections between the content studied in Mathematics and other school and daily knowledges. A poor classification, in turn, represents a blurring of the boundaries between contents.

For Bernstein (2000), the "framework" regulates the control relationships within a context - ECM texts in our case, and dictates how the content can be transmitted in the pedagogical relationship. Thus, when the teacher is the one who determines what will be taught to students and does not allow any interference, we have an example of a strong framework. In contrast, when control is shared during the teacher/student interaction over the distinctive characteristics of interactive and localization principles that constitute the communicative context, the framework is weak. We understand oral, written, visual and gestural communication as interactive principles and subjects, objects and physical space as localization principles.

Therefore, we consider educational curriculum materials a pedagogical text, which means they carry some message about the school pedagogical practice. In the educational context, for example, the production of a text in a mathematics class results from consideration of the recognition rules (what can be said) and the use of the realization rules (how something can be said) (BERNSTEIN, 2000).

To refer to the context in which the school pedagogical practice takes place, Bernstein (2000) associates the concept of communicative context with two fundamental principles: interactional and organizational principles. The first - which interests us in this study - runs through the relationship between teacher/student, being that discursive rules are linked to control of the communicative context, which consist of selection, sequencing, pacing and evaluation criteria, along with the posture and position of the subjects involved in the school pedagogical practice. The second principle regulates the physical location and the form of its realization, that is, the mutual relationship and the space in which the subjects are involved. Thus, the interactional principle of the communicative context is considered one of the message's dimensions, which creates specific rules to generate what counts as communication or a set of possible texts.

To analyze the interactional dimension of school pedagogical practice, we resort to the concept of framing, used according to Bernstein (2000), which means, in the educational context, that framing regulates the realization of communication between the subjects in interaction, i.e., we are interested to understand how the control relations between teachers and students, and between students, are structured and shared through the texts in ECM.

According to Bernstein (2003), the discursive selection rule concerns the principles that establish the selection of theme, subjects, assignments, materials used, content or, for example, data expressed in the texts of educational curriculum materials. Discursive sequence rule refers to the principles establishing what will be learned before and what will be learned afterwards (FERREIRA; MORES, 2017; MORAIS; NEVES; FERREIRA, 2019). Discursive pacing rule comprises the time allocated to learning (FERREIRA; MORES, 2017; MORAIS; NEVES; FERREIRA, 2019). Discursive evaluation criterion rule is linked to instruction, that is, the degree of explicitness of the teacher when communicating with

students during exploration of the content (FERREIRA; MORES, 2017; MORAIS; NEVES; FERREIRA, 2019).

In theoretical and methodological terms, our study comes close to these investigations presented, but it is distant from the empirical locus. Our focus is the message present in ECM texts. After describing the theoretical framework, which allows us to dialogue with the data in this article, our objective is to identify and characterize the variations in the message that occur within interactional dimension, with regard to the school pedagogical practice represented in the texts of educational curriculum materials. In the next section, we present details about the research context.

METHODOLOGICAL PROCEDURES

The present investigation has a qualitative nature (LUDKE; ANDRÉ, 2012), since our intention was to identify and characterize the control relationships between teacher/student and between students, which are represented through ECM texts regulated by discursive rules (selection, sequence, pacing and evaluation criteria) that characterize the variations in the messages.

For this, we use documentary analysis as the main procedure of data production, in order to identify factual information in them, always considering the issues of interest (KRIPKA; SCHELLER; BONOTTO, 2015). Thus, we seek to produce new knowledge about the studied phenomenon - Educational Curriculum Materials -, from the perspectives captured in the documents, i.e., the analyzed documents were ECM produced by groups GEPETICEM, OEM and GEPEFOPEM.

The first document refers to the educational curriculum material produced by members of the Study and Research Group on Information and Communication Technologies in Mathematical Education (GEPETICEM), from the Federal Rural University of Rio de Janeiro (UFRRJ), under the coordination of Professor Dr Marcelo Almeida Bairral. This material explores mathematical content of Elementary and Secondary Education, using the Dynamic Geometry environment with digital technology. The material is available in a free access repository, being all parts of it available for download. In the present case, we analyzed the contents contained in tabs: presentation of the material, mathematical assignment for students, students' answers and teacher's narrative. For the operationalization of our analysis, we designated three materials chosen as follows: ECM1 addresses the theme "Geometrizing linear systems 2x2"; ECM2 deals with "Notable points in the triangle" and ECM3 material is "Building and analyzing graphs of the Human Development Index".

The second document contains materials produced by a collaborative group named Observatory of Mathematical Education (OEM), linked to Federal University of Bahia (UFBA), under the coordination of Professor Dr. Jonei Cerqueira Barbosa. This material explores the mathematics content of Elementary School II. Content of the following tabs was analyzed: planning, student assignment, teacher solution, student solution, teacher narrative and classroom videos. The four materials analyzed were designated as follows: ECM4 addresses the theme "Identifying congruent angles and angle bisector in Elementary Education"; ECM5 works on the theme "Discovering metric relationships in the right triangle"; ECM6 deals with the theme "Investigating the sum of the internal angles of a polygon using Geogebra" and ECM7 depicts the theme "Only the square is quadrilateral".

The third document analyzed was the educational curriculum material "Multimedia Resource in Teacher Education", Multimedia Case: The necklaces, developed by the Research Group on Training of Teachers who Teach Mathematics (GEPEFOPEM), of the State University of Londrina (UEL), under the coordination of Professor Dr. Márcia Cristina de Costa Trindade Cyrino. This material explores the mathematical topic Algebra of Elementary Education. The different elements that make up this case are organized into five sections: (i) Introduction of the Multimedia Case; (ii) Before class; (iii) The class; (iv) Reflection after class; (v) Practicing. With exception of the first section, questions are proposed in all other sections with the intention to promote reflections by teachers under training. In the last section, "Practicing", the teacher under training is invited to elaborate, develop and film a class from the perspective of Exploratory Teaching, in order to problematize it later. For our analysis, we will designate this material as ECM8.

The process of analysis started with reading the material's content, tab by tab, considering the intersection of two elements: conceptual, based on the theoretical framework, and excerpts from the data corpus. Thus, we identified categories, a priori, that offer elements to analyze the discursive rules of ECM

texts thus denominated: a) The selection of contents of the pedagogical practice; b) The sequencing of contents of the pedagogical practice; c) The pacing of contents of the pedagogical practice and; d) The criterion for evaluating pedagogical practice.

Each of these categories presupposes specific actions in the school pedagogical practice of teachers who teach mathematics. Such categories were analyzed and interpreted in the light of Bernstein's theory (2000) and the Educational Curriculum Materials literature.

The data analysis was inspired by Bernstein's analytical perspective (language of internal description) and empirical materials (language of external description). Based on the relation between the concepts provided by the theory and the data suggested by the empirical analyses of the three materials, a dynamic relation was formed, making it possible, with more depth, to understand the reality we intend to investigate (BERNSTEIN, 2000; MORAIS; NEVES; FERREIRA, 2019).

The language of internal description approaches the concepts contained in a theory (in our case, Basil Bernstein's theory, especially the framing principle) with the purpose of creating a conceptual language (theoretical model). The language of external description, on the other hand, refers to models derived from the relation between empirical data (in this case, material texts) and the internal language of description (BERNSTEIN, 2000). A priori, for data analysis in each category, we selected excerpts/dialogues from the materials that show signs of variation in the messages. Finally, we discuss the results in the light of literature and theory.

For this, Bernstein's (2000) framing concept was used, as well as its variation (strengthened or weakened) which, theoretically, reflects the control in the communication relationship between teacher/students and between students, that is, the degree of intervention/participation of students in the teaching and learning processes. Then, we present the data analysis.

PRESENTATION AND DISCUSSION OF DATA

In this section, we present the discursive rules that were analyzed individually (selection, sequence, pacing and evaluation criteria). For this, we used the concept of framing and its variations in the identification and characterization of messages from pedagogical practice on the interactional dimension (BERNSTEIN, 2000; FERREIRA; MORES, 2017; MORAIS; NEVES; FERREIRA, 2019).

a) Selection of pedagogical practice's content

In this category, we characterize the messages expressed in texts of educational curriculum materials regarding the discursive selection rule, that is, who controls the selection of the following indicators: assignment theme, quantitative information, content, resources used, procedures and resolution strategies.

The material texts are structured in different assignments. ECM4's assignment, for example, addresses the content of congruent angles and angle bisector (Figure 1). In the assignment of Figure 1, *what* involves the mathematical content Geometry and *how* the way of presenting the assignment to students for solving. This assignment is structured, with no possibility of selecting other aspects than those provided for students. Thus, it communicates a relationship between teacher (a) and students in which the framework is strengthened, that is, the materials represent a school pedagogical practice characterized by a clear control in selection of the contents, the assignment's theme, quantitative information and resources used.

Figure 1 – Math assignment from MCE4

Dear student, the assignment to be done involves congruence of angles and bisector.
Shall we begin?

1) Build two angles in GeoGebra *software*. In the first angle, draw any semi-straight line from its vertex. In the second angle, build two angles in GeoGebra *software*. In the first angle, draw any semi-straight line from its vertex. In the second angle, draw a "bisector" ß also from its vertex.
a) Comment on what you have observed from the procedures performed.
b) What can we conclude in relation to the semi-straight line drawn in the first angle and the bisector drawn in the second angle?

Source: www.educacaomatematica.ufba.br

Based on the eight materials analyzed from three ECM, we did not identify any interference from the students on the selection of contents of the pedagogical practice to be transmitted at the time of exploration/discussion of the mathematical assignment under study. Thus, the control concerning this discursive rule falls entirely on the teacher. We bring some illustrations of this discursive rule, for example, illustrative excerpts present in the texts of ECM showing the teacher's control during exploration/discussion and orientation of the mathematical assignment's resolution:

> After talking about the activity and the purpose of doing it with the class, we distributed the sheets with the assignment to the students and informed them they could do it in groups (Narrative of ECM1's teacher);
> They read the activity on the whiteboard tab and then went to the GeoGebra tab and started moving the triangle that was already built with the notable points (Narrative of ECM2's teacher);
> I distributed the assignments and then the kits among the groups. In these kits, there were two pairs of triangles, a blue one and a red one (Narrative of ECM5's teacher);
> When implementing the assignment, ruler, protractor and quadrilaterals kit (one square, one rectangle, one rhombus, one parallelogram, and two trapezoids: an isosceles and a rectangle) were handed out. Then I suggested students to manipulate the material received (Narrative of ECM7's teacher);
> Guys, so today we are going to work on an assignment, just like the one we did yesterday, so we are going to get into groups, again, of three people. Pay attention, we have an assignment we have to follow as a team. 'The necklaces' is the title of the assignment. Everyone follows along. (Excerpted from the lesson - proposition and presentation of the assignment - Episode 1 of ECM8).

These excerpts from the texts show a relationship between teacher and students in which the control rested entirely with the teacher for distribution of the mathematical assignment, as well as the way it would be developed, because it was he/she who selected, directed and indicated all moments of the class. In the lesson planning, it was clear what would be done at that time of the assignment and how each step would be. The materials express a relation, through its structure, in which the control over the selection rules is not shared with the students, characterizing a strengthened framework, with the control clearly located in the teacher.

Silva's study (2012) analyzed the assignments on the Environment theme in a Biology textbook. The results revealed the book indicated the elements that constitute the assignments. When reproducing these in the classroom, the teacher establishes control, while the student is only responsible for solving them. As a result, the assignment on the Environment theme had a strengthened framework with selection control, indicated by the book and by the teacher.

In line with Bernstein's theory (2000), Prado, Oliveira and Barbosa (2014) investigated the image of pedagogical practice in the mathematical modeling environment represented in educational curriculum materials produced by a collaborative group. Their results pointed to the discursive selection rule, through which the teacher indicated the theme and the problem, as well as a set of quantitative and qualitative information. Students determined the structure, their own procedures and solutions, that is, they selected mathematical content and information on the topic within the content and information pre-selected by the teacher.

Diniz's study (2017) analyzed curriculum materials with educational characteristics. The results showed framing is variable in the control over the rules for selecting the strategies for solving assignments, depending on the material, sometimes tending to strong (when the strategies are suggested by the teacher), sometimes tending to weak (when strategies are presented by students).

When analyzing the results of these surveys, we observe that the texts express relationships between teachers and students in which the framework is strengthened, that is, the control of selection, in majority, is centered on the teacher. Therefore, he/she selects the "what" to be studied and discussed in the classroom, limiting the student's participation in this relationship. According to Morais, Neves and Ferreira (2019), a characteristic favorable to the learning of students from discursive *selection* rule is a framework strengthened at the macro level and weakened at the micro level, that is, students should be allowed some control, such as, for example, the valorization of their experiences in the community and

the integration with school contents, elevating the positioning of students, which constitutes a condition for school learning (PICCOLI, 2009).

Therefore, in the light of Bernstein's theory (2000), the message suggested in texts of educational curriculum materials, regarding the discursive rule of selection, expresses a strengthened framework, since the teacher exercises control in the selection and organization of the content carried out in pedagogical communication, as well as proposes an organization for the development of classes, that is, directs and indicates all moments of the class. Thus, the teacher planned what to say and how to say it, elaborating and selecting the mathematical assignments students would develop in class. This framework changed when the teacher performed the resolution of assignments with students.

b) Content sequencing of the pedagogical practice

In this category, the analysis' focus was on how the texts express relationships between teacher and students regarding the control exercised by the subjects in the discursive rule of sequence, that is, the order of actions/contents/strategies performed in pedagogical communication.

In general, the texts of the eight ECM presented a strengthened framework, for example, when they determined how the mathematical assignment would be explored, defining an order for explaining the content. When systematizing the most relevant aspects addressed in class, these were also determined by the teacher. However, he/she allowed students to intervene with questions during the explanations, causing the interruption of the sequence to be followed, answering the questions raised by them, even if it implied to depart a little from the content covered. Consequently, such practice caused this framework to decrease, but, normally, then, he/she resumed the explanation sequence. The clippings below exemplify this discursive rule:

> In the task, students were asked to create three slider controls and plot the line according to the controls, because when they moved this tool, the generated line would move. Then, they were asked to put the equation $2x + 5x = 3$ and finally make three observations about the lines when moving them (MCE1's teacher narrative).
>
> To solve the task, the class was divided into groups of three students and 3 classes of 50 minutes were used - two for implementation and one for the socialization of the ideas developed in the implementation. We started the class by doing a collective reading (video 1) and asking students to open GeoGebra software, previously presented to the class, then we read the task that was composed of two questions. The first question asked students to build polygons of 3, 4, 5 and 6 sides in GeoGebra and then draw triangles inside the polygons. Subsequently, they should fill in a table that requested the number of triangles formed from the polygons and the sum of the internal angles of that polygon. The second question asked for the sum of the angles of the polygons of 9, 10 and 50 sides (Narrative of MCE6's teacher).
>
> In the task implementation, the class was divided into groups and, immediately afterwards, the ruler, protractor and quadrilateral kit were handed over. Then, I suggested students to manipulate the material they received. Right after the manipulation and recognition of the kit parts, I started the first provocations seeking to probe which understandings the students had about the quadrilaterals that were available (Narrative of MCE7's teacher).

These three clippings show that content sequencing of the pedagogical practice is defined according to an order presented by the teacher. Thus, even if there had been interventions by students, the order of the contents was exclusively controlled by the teacher (MORAIS; NEVES; FERREIRA, 2019). In addition, the analysis suggests the existence of a division in stages to fulfill the requirements requested from students during school pedagogical practice, expressed in the materials' texts. For a better understanding of what we are exposing, we present excerpts of some of the materials and the respective sequences (explicit), as can be said:

> (Excerpt 1) Build two angles in the GeoGebra software. At the first angle, draw any semi-straight line from its vertex. In the second angle, also from the vertex of the angle, draw a "bisector". a) Comment on what you have observed from the procedures performed. b) What can we conclude about the semi-straight line in the first angle and the bisector in the second angle? [Task withdrawn from MCE4].
>
> (Excerpt 2) Look at the triangles you have received and answer the following questions: a) What do they have in common? b) In the two triangles without identification on the sides, consider

> the hypotenuse as the base and plot the height of the triangle in relation to the base. Then, cut the two triangles on the line segment you plotted. What did you get? c) Name the sides of the figures that you obtained when you cut the triangles. Observe and compare with the two triangles that have identification and record your observations [Task taken from MCE5].

In sections (1) and (2), more general questions of the Geometry assignment (what) are presented. For example, in section (1), we notice the assignment asks the student to make two angles with the help of GeoGebra, followed by two auxiliary questions. The mathematical assignment clearly spells out the content and the procedure to be addressed, through which teachers and students explore concepts of Geometry in the mathematical assignment (how). Thus, we infer that a progressive order of content development is explicit, that is, problem situations require the use of mathematical content in a defined sequence, which may vary from a lower to a higher difficulty degree.

In the second example, excerpt (2), the material's assignment suggests the teacher to present it and asks the students to observe triangles and answer the auxiliary questions. In this case, we may infer that the auxiliary questions clearly express a progressive order of strategies that could be used by the students, thus limiting the students to choose other strategies. This means the material's text indicates a sequencing in the statement of the mathematical assignment, which, during implementation in the classroom, follows the structure presented in it.

Therefore, in the two excerpts from the materials' texts, we may see that the materials determine steps to be followed when relocating mathematical assignments in the classroom context, with regard to the order of the concepts to be presented and the form of their presentation/structuring. Thus, they communicate discursive rules of explicit sequence (BERNSTEIN, 2000), since it is possible to clearly observe an order in the procedures for implementation of the mathematical assignment. For Sullivan et al. (2015), the structure of a mathematical assignment - for example, excerpts (1) and (2) presented - can vary from simple sentences to complex sentences, which include an organized division of questions, or a list of sequentially structured questions in order to promote students' understanding of a mathematical concept or content or topic (JESUS; CYRINO; OLIVEIRA, 2018). The texts in the materials do not indicate an opening for students to choose their sequences for solving assignments, which tends to suggest strengthening of framework regarding the control over rules of sequence (for example, items "a" of assignments (1) and (2)). Thus, we infer that the fact the assignment delimits a sequence for the use of content, procedures or strategies, presupposes students may have more possibilities on the decision of how to solve the assignments. That is, they can organize their thoughts, their own ways, their solutions and systematizations, being allowed to have greater control over the development of an assignment in the classroom context. We can translate this, in Bernsteinian terms, as a situation of framework strengthening. According to Sullivan et al. (2015), when a mathematical assignment is allowed to be solved in different ways, it has the potential to engage students in an intellectual activity that develops their autonomy and self-confidence.

In school pedagogical practice, expressed by the material's texts, in particular, with regard to the sequence in the implementation of assignments, we notice there is a sequence suggested in the statement of the mathematical assignment or during the resolution (DINIZ, 2017). Thus, the format of the assignment indicates the teacher controls what comes before and what comes after, both in terms of content and in terms of strategies and procedures.

From the reading of the existing contents in tabs of the analyzed materials, there is no explicit evidence of students taking contrary decisions regarding the sequencing rules. In other words, the materials suggest a relationship in which the control over the sequence is with the teacher, who assumes it in the sequencing rules in school pedagogical practice, which, in Bernsteinian terms, configures a strengthened framework.

At the heart of this discussion, Silva (2012) portrayed, specifically, how the theme Environment was addressed in the Biology textbook, examining the relations between teacher and students, school scientific discourse and daily discourse, spaces of students, school and community as represented and framed in the texts and assignments concerning the Environment theme. The results showed that the discursive rule of sequence, in general, established the sequence of procedures students should follow to perform it, that is, they could read the text and then resolve the issue. Thus, the control of the sequence

falls mainly on the teacher, who, using such textbook assignments, must make clear the rules that students can follow for the production of the text.

The results of the study by Prado, Oliveira and Barbosa (2014) show the teacher exercised strong control over the sequence of procedures, strategies and content. At other times, the authors showed a possibility of reducing control in the mathematical assignment: not explaining the way students organize their solutions in the assignment. This leads them to have a greater chance of deciding the order in which their solutions will be presented.

These two researches are close to our study, since both used the theoretical framework of Basil Bernstein and their results are in agreement with ours, since their analyses showed a sequencing suggested by the teacher in the statement of the assignment (DINIZ, 2017), both in the use of the Biology textbook (SILVA, 2012), and in the content of educational curriculum materials on mathematical modeling (PRADO; OLIVEIRA; BARBOSA, 2014).

Based on our data, the teacher assumed greater control over the discursive rule of sequence in school pedagogical practice. However, we agree with Silva (2012) when he argues that, in terms of selection and sequence, the majority occurrence of strengthened frameworks may not favor the production of texts by students. In this case, attention to the variation of the framing levels is necessary, so that students are given autonomy to present their resolution strategies, not only being under teacher's control. This means he/she may suggest a sequencing in the statement of the mathematical assignment that can be changed by both teacher and students in the implementation in the classroom (DINIZ, 2017).

In general, excerpts from the material's texts allow us to point out that the strengthened framing message in teacher/student relationship is expressed in the discursive rule of sequence, that is, the resolution of mathematical assignments is carried out following an order determined by the teacher, in the statement of the assignment or during the resolution, assuming control over the sequencing rules in the school pedagogical practice. Therefore, teachers planned *what* to say and *how* to say it, elaborating and sequencing the mathematical assignments that students would develop in class.

c) The pacing of contents of the pedagogical practice

In this category, we present messages from those who establish a relation between the content covered and the time spent in pedagogical communication. When analyzing the tabs of six materials (ECM1, ECM2, ECM3, ECM5, ECM6 and ECM7), we observe that, when resolving the mathematical assignment, the teacher did not mark the time allocated for its execution, but, during its resolution, the pacing of the pedagogical practice's content was guided by the teacher's questions during the dynamics in the classroom.

However, the texts of ECM4 and ECM8 presented more elements for this discursive rule. For that, we extracted some excerpts about the pacing rule expressed in the materials' texts that significantly illustrated the relationship between teacher and students. As an example, in ECM8, it is evident that the material's text suggests the teacher's control over the time or the expected speed of sequencing rules, as it marks the time allocated to the assignment at the beginning. Furthermore, the assignment is suggested to be carried out in the classroom, together, thus providing control of school time, as it may be seen in the teacher's speech: "Come on then, today you will have time to do the assignment. When the times is over, I will warn everyone. It is finished, silence" (The class - proposition and presentation of the assignment - episode 1).

Another excerpt from the material's text shows how the teacher controlled time in the classroom: "I think the time could be a little longer for me to explore that last part of the systematization" (Description - reflection after class - collective discussion of assignment). We also observed that the material's text indicates the teacher's concern with the time of the assignment, imprinting, albeit indirectly, the speed in the discussions and resolution of the questions, as follows: "Okay, let's work, because it's almost time. Maria, write or you will get lost" (Description: The class - assignment development - Episode 5).

In ECM4's text, the teacher controls the time in the classroom, saying: "There was time for them to perform the procedures". At another point, she argues, "I gave the students ten more minutes to complete their answers." These excerpts suggest a relationship in which the teacher made explicit the time allotted for solving the assignment. That is, it shows total control over the time of accomplishing

the assignments, reminding students of the time limit and allowing for the due prolongation of the assignments, setting the pace for exploring the contents, carrying out the activities and the time for using these materials. Such procedure denotes a strengthening of the relationship between teacher and students regarding the rule of pacing in the content exploration. This means that there was no sharing (relationship between teacher and students) of control over the pacing of school pedagogical practice. In this case, we observe how the teacher controls time in school pedagogical practice. Morais et al. (2018) emphasize that a strengthened framework involves a pace almost exclusively centered on the teacher, since it involves the speed at which learning is expected to occur (BERNSTEIN, 2003).

Thus, the texts in the materials suggest a relationship in which the teacher has total control over the learning time, as it is he who dictates the pace of learning, even though the text communicates that the assignment is done along with students. In this sense, Prado, Oliveira and Barbosa (2014) analyzed the images of the pedagogical practice in texts of the educational curriculum materials on mathematical modeling, pointing out, in the results, that the control over the image of interactional dimension (relationship between subjects) is more frequently centered on the teacher, to the detriment of a shared control between him/her and the students. Regarding the pace of this practice, there was sharing about the valorization of speech and the encouragement of oral texts produced by students, as well as aspects from daily life in the arguments produced by students, in mathematical assignments in the classroom.

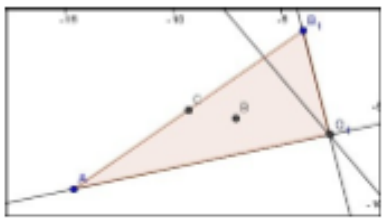
Therefore, excerpts from the material's texts allow us to point out that the message expressed in relation to the discursive rule of pacing resides in the valorization of the teacher's control over the learning time. Thus, the texts express relationships between teacher and students in which the framework is strengthened. The materials suggest a relationship in which the teacher tends to control how many questions can be asked in a given class, as well as the duration for each auxiliary question and the form of an explanation, which strengthens the framework regarding the pace with which the teaching and learning process takes place.

d) The criteria for evaluating pedagogical practice

In this category, we present possible indications of what may be explicit or implicit in the presentation of the contents covered, type of work/activity performed in pedagogical communication.

When we seek to analyze the teacher/student relationship regarding the control of the subjects in a given pedagogical relationship, we bring illustrative excerpts from the materials' texts that can evidence this message.

Figure 2 – Exerpt of the dialogue transcription and the answers' ideas (ECM02)

	Rose: yes, it is rectangle Professor: yes Professor: Flávia Flávia: yes, yes. Jonatas: it is is easy to be seen..., because the orthocenter is the meeting of the heights, right? Jonatas: and in rectangle triangle, 2 heights are the collectors. Jonatas: is what I said right? Artur: I agree, Jonatas. Artur: What do Flávia and Rose say? Flávia: I also agree Rose: agreed.	The student Rose tried to justify one of the observations (*if the triangle is a rectangle one, O is the vertex of the straight angle and C is the hypotenuse midpoint*) moving the triangle until its format resembled or looked like the rectangle triangle (*"yes, it is rectangle"*, 90).

Source: www.gepeticem.ufrrj.br

In Bernsteinian terms, this excerpt in the material shows a relationship in which teacher and students share control in solving the mathematical assignment, as shown in Figure 2. The dialogues between teacher and students refer to a joint discussion in solving the math assignment. This means the material's text suggests the existence of an open communication between the subjects (weakened framework), by enabling students to participate in the discussion, in the dynamics of being questioned

about the information present in the mathematical assignment, which can contribute to better use of students, even if this communication can configure an answer from the teacher in the most direct way, making few situations that prolong the dialogue impossible, in a way (SILVA; SOUZA; SANTOS, 2018; MORAIS; NEVES ; FERREIRA, 2019). According to Magalhães, Mortimer and Silva (2016), the engagement of students in situations of dialogue initiated by the questions is essential for the establishment of dialogues.

The analysis of Figure 2 showed that dialogue in the relationship between teacher and students was characterized by open communication, through which not only were several students' responses heard during the resolution of the mathematical assignment, but also inferences were allowed, seeking to involve students in the discussion. The evaluation criterion rule is one of the discursive rules that not only influence, but also explain the students' results in the first moment, becoming even more efficient when the communication relationships between the subjects are open (PIRES; MORAIS; NEVES, 2004; MORAIS; NEVES; FERREIRA, 2019).

Another striking characteristic of the teacher's pedagogical practice, expressed in the texts of educational curriculum materials, concerns the definition of the assignment as to its objective, that is, the teacher clearly expresses his/her objectives, always making it clear to students what they are meant to do, as this leads to a greater chance of success as to the requested assignment. The student's understanding of what is expected of him/her is often achieved with the reinforcement of explicitness through the discussion that continuously occurs in class (MORAES; NEVES; FERREIRA, 2019).

Next, we selected two excerpts to exemplify the definition of the assignment in terms of its objective: "This assignment had as objectives: to recognize internal angles of any convex polygon; calculate the sum of the internal angles of any convex polygon and generalize the sum of its internal angles of a n-sided polygon" (Narrative of ECM6's teacher). ECM7 presented the "objective to identify quadrilaterals based on their properties" (ECM7 planning tab), while ECM4 aimed to "recognize congruent angles as those that have the same measure" (ECM4 planning tab).

From these excerpts, the texts of educational curriculum materials suggest that the teacher, when proposing the mathematical assignment, always evidenced its objectives in a clear way, which can generate understanding on the part of students. This means the discursive rule of evaluation criteria must be explicit and specific so that students recognize and know what and how to produce a text (BERNSTEIN, 2003).

Therefore, the framework for the discursive rule was characterized as strengthened, as we infer the teacher made clear the objectives of the mathematical assignments that students should perform and the possible procedures for these to be executed during class in a clear and direct way (GALIAN, 2012). The explanation of the discursive rule of evaluation criteria, contrary to what teachers may argue, does not hinder students' creativity, autonomy and cognitive development, being relevant to their learning.

In the following excerpt, we exemplify the control sharing in the relationship between teacher and students: "Activity 3: research activity - Look for information on the HDI of the city where you live through some search engine and insert it in the table. Compare with the triangles of the countries you have built" (Assignment taken from ECM3). In this case, when the research assignment was proposed, we can assume that students had "freedom" to present their strategies to the teacher when asked to perform the extra-school activity. They were expected to come up with different strategies to better approach the subject, therefore, presenting different solutions and characterizing the relationship between teacher and students as a variation in control, that is, it is weakened by allowing students to actively participate in the making of the mathematical assignment.

According to the excerpts used, there was a strengthened framework, since the explanations of mathematical assignment's objectives are detailed and clear. However, there was a weakened framework when the resolution of the mathematical assignment was shared or when an extra-school activity was requested for studies. Thus, the school pedagogical practices varied the frameworks between weak and strong, allowing us to point out, in general, that the message expressed in the texts of the materials in relation to the discursive rule of evaluation criteria are: teachers and students share control in solving the mathematical assignment; the existence of open communication between the subjects; explanation of the objective of the mathematical assignment and text to be learned.

FINAL CONSIDERATIONS

The present study had the purpose of identifying and characterizing the message that occurs in the interactional dimension and its variations, with regard to the school pedagogical practice represented in texts from educational curriculum materials. For that, we used the concept of framing from Basil Bernstein's theory to bring out some characteristics of the messages.

The message related to what is taught is noticeable in the explanation of Geometry and Algebra content in texts from educational curriculum materials, being presented in different mathematical representations, for example, graphs, tables, geometric figures, etc. Each student or group of students was guided by their written production and teacher's written/oral interventions, being able to follow a path when dealing with content contemplated in the mathematical assignment (MENDES; BURIASCO, 2018).

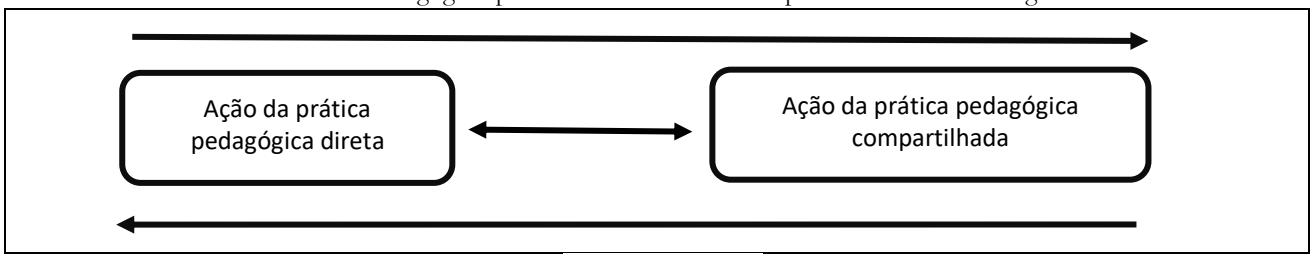
As for the message related to how to teach, the ECM's texts suggest the sequential reproductive use of the mathematical assignment. Here, it is understood as following the order of the mathematical assignment present in the material's text, sequentially organized and methodologically ordered, controlling what comes before and what comes after, regulating the temporal ordering of the mathematical content presented to students.

In the sequential reproductive use of the mathematical assignment, in the discursive rules, the teacher takes actions of pedagogical practice based on the development of the mathematical teaching assignment. Its main goal is to help students represent their resolutions and justifications, being, properly, a pedagogical relationship that involves the relation between teacher's action and student's action. It also involves some pedagogical actions represented in the texts of the analyzed materials, such as: action to organize the environment in the classroom; action of presenting the mathematical assignment; action to present the objective of the mathematical assignment; action to follow the structure of the text; time control action; action to share the resolution of the mathematical assignment and action to promote learning (ZASLAVSKY, 2017; MATA-PEREIRA; PONTE, 2018).

Systematically, the messages of the interactional dimension of school pedagogical practice are expressed in the texts of the analyzed materials through the discursive rules, presenting a variation of the framework, which means the control over the relationship between subjects is sometimes centered on the (a) teacher (a), specifically in the following aspects: the content, the assignment's theme and the quantitative information. However, at other times, the control is shared with students for the following aspects: procedures and resolution strategies.

Figure 3, below, represents the relationship between the actions of pedagogical practice and the mathematical assignment represented in texts of the educational curriculum materials analyzed.

FIGURE 3 – Pedagogical practice action in the development of the math assignment



Source: the authors

From the analysis of the discursive rules presented, we characterize the action of the school pedagogical practice with the mathematical assignment between two extremes: on one hand, the "action of direct pedagogical practice", which characterizes the action of the pedagogical practice with total teacher's control over the sequential reproductive use of the mathematical assignment, that is, an action that goes from teacher towards student, for example, paying attention to the teacher's explanation about the content and the mathematical assignment; receiving help from the teacher on the content approach and the mathematical assignment; answer to the teacher's questions. On the other hand, there is the "action of shared pedagogical practice", in which actions manifested by students during the production

of their text and/or actions between students and teacher are characterized, indicating resolution strategies for the proposed mathematical assignment, that is, an action that starts from the student towards the teacher and/or another student in the exploration of the subject under study. Thus, there is the sharing of meanings and ideas, an exchange, for example: assisting the group's colleague in solving the mathematical assignment; discussing and sharing possible solution strategies; receiving help from students on the mathematical assignment, etc.

Thereby, during the sequential reproductive use of the mathematical assignment, along the teaching and learning processes, other actions of school pedagogical practice can be triggered, going from one extreme to the other and vice versa, causing an infinity of other actions to emerge, characterizing possible communications between these extremes, depending on the objectives of the mathematical assignment and the students' needs. This characterizes the movement between the extremes of "discursive combination", which refer to the speeches produced in the relationship between teachers and students and between students in the school environment. This openness in communication between teachers and students and between students can contribute to improve students' learning (FERREIRA; MORES, 2017; MORAIS; NEVES; FERREIRA, 2019). Thus, such an image does not exhaust the possibilities of actions of pedagogical practice in texts of Educational Curriculum Materials, but only points out arenas of possible approximations in the field of Education and Mathematical Education (BARBOSA, 2017).

Therefore, the documentary analysis presented in this paper brings indications that ECM's texts may constitute another pedagogical resource to support the teachers' learning, as they present a sequential chaining which allows understanding the mathematical content in training opportunities for initial training and/or the implementation of training proposals for in-service teachers. In this sense, the adoption of theoretical references on the topic can assist in the process of planning and executing interdisciplinary practices, in the collaboration between professionals from different areas of knowledge.

Understanding the ECM's message can be a good starting point for the design of new Educational Curriculum Materials suitable for the pedagogical practices of teachers who teach Mathematics. Thus, it may bring relevant results for material developers and/or for teachers who teach Mathematics, in order to inform about how the interaction between teachers and students is represented in the implementation of the mathematical assignments present there and alert to certain aspects inherent to the development of the pedagogical practice. Likewise, the ECM's texts bring contributions to the field of Education and Mathematical Education, specifically for/in the training of teachers who teach Mathematics, as they present signs on the horizon of practices and knowledge possible within each educational curriculum material analyzed.

Thus, we conclude this article by announcing questions that may prompt future investigations: How does the learning of the teacher who teaches Mathematics occur from the use of the elements that constitute Educational Curriculum Materials? What are the characteristics of the pedagogical practices built by the teacher who teaches Mathematics when making use of the mathematical assignments present in the Educational Curriculum Materials?

Acknowledgements

We would like to thank the professors Doctors Edvaldo Souza Couto, Jonei Cerqueira Barbosa and Marcelo Almeida Barral and Professor Professor Márcia Cristina de Costa Trindade; the members of the Science and Mathematics Teaching Group (ENCIMA): Airam Silva Prado, Jamerson dos Santos Pereira, Lilian Aragão da Silva, Patrícia Petitinga Silva, Neomar Lacerda da Silva and Roberta Gondim Britto for the preliminary considerations to the previous version of this article; and the Dean of Graduate Studies, Research and Technological Innovation (PROPIT) of the Federal University of the South and Southeast of Pará (UNIFESSPA) for supporting research.

The translation of this article into English was funded by the Fundação de Amparo à Pesquisa do Estado de Minas Gerais – FAPEMIG – through the program of supporting the publication of institucional scientific journals

REFERENCES

AGUIAR, W. R.; OLIVEIRA, A. M. Uma análise sociológica bernsteniana sobre os usos de materiais curriculares educativos. **Educação Matemática Pesquisa**, São Paulo, v.19, n.1, p. 403-422, 2017.

AGUIAR, W. R.; OLIVEIRA, A. M. P. A Transformação dos textos dos materiais curriculares educativos por professores de matemática: uma análise dos princípios presentes na prática pedagógica. **Boletim de Educação Matemática**, v. 28, n. 49, p. 580-600, 2014.

BARBOSA, J. C. Abordagens teóricas e metodológicas na educação matemática: aproximações e distanciamentos. **38ª Reunião Nacional da ANPEd** – UFMA – São Luís/MA, 2017.

BEHM, S. L.; LLOYD, G. M. Factors influencing student teachers' use of mathematics curriculum materials. In: REMILLARD, J. T.; HERBEL-EISENMANN, B.A.; LLOYD, G. M. (Ed.). **Mathematics teachers at work**: connecting curriculum materials and classroom instruction. New York: Routledge, 2009. p. 205-222.

BERNSTEIN, B. **Pedagogy, symbolic control and identity**: theory, research, critique. New York: Rowman & Littlefield, 2000.

BERNSTEIN, B. **Class, codes and control**: the structuring of pedagogic discourse. London: Routledge, 2003. v.4.

BEYER, C.; DAVIS, E. A. **Supporting preservice elementary teachers' critique and adaptation of science lesson plans using educative curriculum materials**. Springer Science+Business Media, B.V, 2009.

BROWN, M. W. **Teaching by design**: understanding the intersection between teacher practice and the design of curricular innovations. 543f. Dissertation (Doctor of Philosophy – Field of Education and Social Policy: Learning Sciences). Northwestern University, Illinois/United States, 2002.

BROWN, M. W. The teacher – tool relationship theorizing the design and use of curriculum materials. In: REMILLARD, J. T.; HERBEL-EISENMANN, B.A.; LLOYD, G. M. (Ed.). **Mathematics teachers at work connecting curriculum materials and classroom instruction**. Routledge, Taylor and Francis: Madison Ave, New York, 2009. p. 38-57.

CYRINO, M. C. C. T.; OLIVEIRA, H. M. Ensino exploratório e os casos multimídia na formação de professores que ensinam matemática. *In*: CYRINO, M. C. C. T. (Org). **Recurso multimídia para a formação de professores que ensinam matemática**: elaboração e perspectivas. Londrina: EDUEL, 2016. p. 19-32.

DAVIS, E.; JANSEN, F. J. J. M.; DRIEL, J. H. V. **Teachers and science curriculum materials**: where we are and where we need to go. Esera, Dubai, Out. 2017.

DINIZ, P. **Materiais curriculares educativos e professores que ensinam matemática**: mensagem, recontextualização e identidade pedagógica. 2017. 138. Tese (Doutorado em Educação) – Faculdade de Educação, Universidade Federal da Bahia, Salvador, 2017.

FERREIRA, S.; MORAES, A. M. Exigência conceptual do trabalho prático: abordagem multidisciplinar de análise do discurso pedagógico na aula de ciências. **Revista Práxis Educativa**, Ponta Grossa, v. 12, n. 1, p. 25-47, jan./abr. 2017 Disponível em: http://www.revistas2.uepg.br/index.php/praxiseducativa.

GALIAN, C. V. A. A prática pedagógica e a criação de um contexto favorável para a aprendizagem de ciências no ensino fundamental. **Revista Ciência & Educação**, v. 18, n. 2, p. 419-433, 2012.

JESUS, C. R.; CYRINO, M. C. C. T.; OLIVEIRA, H. M. Análise de tarefas cognitivamente desafiadoras em um processo de formação de professores de matemática. **Educação Matemática Pesquisa**, São Paulo, v. 20, n. 2, p. 21-46, 2018.

KRIPKA, R.; SCHELLER, M.; BONOTTO, D. L. Pesquisa documental: considerações sobre conceitos e caraterísticas na pesquisa qualitativa. In: **Atas CIAIQ2015**, v. 2. Disponível em: < http://proceedings.ciaiq.org/index.php/ciaiq2015/issue/view/4>.

LIMA, S. F. **Relações entre professores e materiais curriculares no ensino de números naturais e sistema de numeração decimal**. 2014. 217f. Dissertação (Mestrado em Educação Matemática) – Faculdade de Ciências Exatas e Tecnologia, Pontifícia Universidade Católica de São Paulo, São Paulo, 2014.

LIMA, K.; JANUARIO, G.; PIRES, C. M. C. Professores e suas relações com materiais que apresentam o currículo de matemática. **Educação Matemática Pesquisa**, São Paulo, v. 18, n. 2, p. 717-740, maio/ago. 2016.

LUDKE, M.; ANDRÉ, M. **Pesquisa em educação**: abordagens qualitativas. São Paulo, SP: EPU, 2012.

MAGALHÃES, S. C.; MORTIMER, E. F.; SILVA, A. F. Uma análise da relação entre a abordagem comunicativa e os tipos de perguntas de duas professoras da educação básica nas aulas de termoquímica. *In*: Encontro Nacional de Ensino de Química, XVIII., Florianópolis, SC. **Anais**... 2016.

MATA-PEREIRA, J.; PONTE, J. P. Promover o raciocínio matemático dos alunos: uma investigação baseada em *design*. **Bolema***,* Rio Claro (SP), v. 32, n. 62, p. 781-801, dez. 2018.

MCCLAIN, K.; ZHAO, Q.; VISNOVSKA, J.; BOWEN, E. Understanding the role of the institutional context in the relationship between teachers and text. In: REMILLARD, J. T.; HERBEL-EISENMANN, B.A.; LLOYD, G. M. (Ed.). **Mathematics teachers at work**: connecting curriculum materials and classroom instruction. New York: Routledge, 2009, p. 56-69.

MCNEILL, K. L.; GONZÁLEZ-HOWARD, M.; MARCO-BUJOSA, L.; LOPER, S.; O'DWYER, L. An examination of how teachers' beliefs about scientific argumentation are impacted by multimedia educative curriculum materials (MECMs). **Paper to be presented at the annual meeting of the National Association for Research in Science Teaching** (NARST), San Antonio, TX, 2017.

MENDES, M. T.; BURIASCO, R. L. C. A utilização da prova em fases como recurso de ensino em aulas de cálculo. **Revista Paranaense de Educação Matemática**, Campo Mourão, v.7, n.14, p.39-53, jul./dez. 2018.

MORAIS, A. M.; NEVES, I. P.; FERREIRA, S. O currículo nas suas dimensões estrutural e interacional: perspectiva de Basil Bernstein. **Práxis Educativa**, Ponta Grossa, v. 14, n. 2, maio/ago. 2019. Disponível em: http://www.revistas2.uepg.br/index.php/praxiseducativa.

NIE, B. et al. An investigation of teachers' intentions and reflections about using Standards-based and traditional textbooks in the classroom. **ZDM**, v. 45, n. 5, p. 699-711, 2013.

OLIVEIRA, A. M. P. **Modelagem matemática e as tensões nos discursos dos professores**. 2010. 200f. Tese (Doutorado em Ensino, Filosofia e História das Ciências). Instituto de Física/Departamento de Ciências Exatas, Universidade Federal da Bahia e Universidade Estadual de Feira de Santana, Salvador, 2010.

OLIVEIRA, H.; MENEZES, L.; CANAVARRO, A. P. Conceptualizando o ensino exploratório da matemática: contributos da prática de uma professora do 3º ciclo para a elaboração de um quadro de referência. **Quadrante**, v. 22, n. 2, p. 29-53, out. 2013.

PACHECO, D. R..; PIRES, C. M. C. . Impactos de materiais curriculares na prática do professor que ensina matemática nos anos iniciais. **Revemat**: Revista Eletrônica de Educação Matemática, v. 10, p. 227-242, 2015.

PICCOLI, L. **Práticas pedagógicas nos processos de alfabetização e de letramento**: análises a partir dos campos da sociologia e da linguagem. Tese (Doutorado em Educação) – Faculdade de Educação, UFRGS, Porto Alegre, RS, 2009. Disponível em: http://www.lume.ufrgs.br/bitstream/handle/10183/18400/000692826.pdf?sequence=1.

PIRES, D.; MORAIS, A.; NEVES, I. Desenvolvimento científico nos primeiros anos de escolaridade. Estudo de características sociológicas específicas da prática pedagógica. **Revista de Educação**, v. 12, n. 2, p. 119-132, 2004. DOI: 10.1002/tea.3660050403

PRADO, A. S.; OLIVEIRA, A. M.; BARBOSA, J. C. Uma análise sobre a imagem da dimensão interacional da prática pedagógica representada em materiais curriculares educativos. **Educação Matemática Pesquisa**, São Paulo (SP), v. 16, n. 2, p. 505-535, 2014.

REMILLARD, Janine T.; HERBEL-EISENMANN, Beth A.; LLOYD, Gwendolyn Monica (Ed.). **Mathematics teachers at work**: connecting curriculum materials and classroom instruction. New York: Taylor & Francis, 2009.

REMILLARD, J. Mapping the relationship between written and enacted curriculum: examining teachers' decision making. *In*: KAISER, G. et al. (Eds.), Invited Lectures from the 13th International Congress on Mathematical Education, **ICME-13** Monographs, p. 481-498, 2018. Disponível em: https://doi.org/10.1007/978-3-319-72170-5_27.

REMILLARD, J.; KIM, Ok-Kyong. Knowledge of curriculum embedded mathematics: exploring a critical domain of teaching. **Educational Studies in Mathematics**, p. 1-17, mar. 2017.

SILVA, S. N. **O tema ambiente em um livro didático de biologia do ensino médio**: uma análise à luz da teoria sociológica de Basil Bernstein. 2012. 206f. Tese (Doutorado em Ensino, Filosofia e História da Ciência) – Universidade Federal da Bahia, Universidade Estadual de Feira de Santana, Salvador, 2012.

SILVA, M. S.; BARBOSA, J. C.; OLIVEIRA, A. M. P. Materiais curriculares educativos sobre modelagem matemática e a recontextualização pedagógica operada por professores iniciantes. **Revista Ibero-americana de Educação Matemática**, n.34, p.47-67, 2013. ISSN: 1815-0640.

SILVA, P.; MORAIS, A. M.; NEVES, I. P. O currículo de ciências no 1.º ciclo do ensino básico: estudo de (des)continuidades na mensagem pedagógica. **Revista Portuguesa de Educação**, Braga, v. 26, n. 1, p. 179-217, 2013.

SILVA, R. L.; SOUZA, G. M. S.; SANTOS, B. F. Questionamentos em aulas de química: um estudo comparativo da prática pedagógica em diferentes contextos sociais. **Revista Brasileira de Pesquisa em Educação em Ciências**, v. 18, n. 1, 2018.

SULLIVAN, P.; ASKEW, M.; CHEESEMAN, J.; CLARK, D.; MORNANE, A.; ROCHE, A.; WALKER, N. Supporting teachers in structuring mathematics lessons involving challenging tasks. **Journal of Mathematics Teacher Education**, v. 18, p.123-140, 2015.

VILAS BOAS, J.; BARBOSA, J. C. Aprendizagem do professor: uma leitura possível. **Ciência e Educação**, Buaru, v. 22, n. 4, p. 1097-1107, 2016.

ZASLAVSKY, A. Ação pedagógica, ação comunicativa e didática. **Conjectura: Filosofia e Educação**, v. 22, n. 1, p. 69-81, jan./abr. 2017.

Submitted: 23/04/2019
Approved: 13/08/2019