



The model and the didactic sequence and the possibilities in the work and continuing education of the professor of civil engineering

O modelo e a sequência didática e as possibilidades no trabalho e na formação continuada do professor da engenharia civil

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INTRODUCTION

The student of the Civil Engineering course, in his academic period, will develop the necessary skills for the learning of mathematical and physical calculations, because for the engineer the professional vision is that of solving problems based on physics and calculations. However, the engineering graduate should be able to communicate orally and in writing in all spheres of activity. The student has contact with writing, during the academic period in curricular components such as Initiation to Scientific Research, where the student should understand the need for scientific techniques for scientific production, knowing the methodology of science, also, should understand the importance of the didactic foundations of scientific research, finally, should develop expression and communication compatible with professional practice, articulating the various levels of training and field of science. The component Initiation to Scientific Research, is offered in the first year, so that the student has knowledge and foundation necessary for academic writing throughout the course. At the end of the course, in the tenth semester, that is, in the fifth year, the student must write his project of conclusion of course, in the Course Conclusion Work, being able to elaborate a scientific article, with theoretical bases and technical specifications of the course, thus improving the logical reasoning skills of search, interpretation and critical analysis of scientific articles, as well as improvement of logical reasoning and communication.

In general, the division of the curricular components of the Civil Engineering course takes place in basic training, specific and professional training. Having as the curricular components of the basic formation, that is, at the beginning of the academic journey, the Fundamental Calculus, Fundamental Physics, Chemistry, Computational Algorithms, Transport Phenomena, Differential and Integral Calculus, Geometry, Statistics and Initiation to Scientific Research, the latter being the only component in which the student must work with the construction of texts. Throughout the course, the professors, in isolation request written works for the students, however, they are not all who demand the academic rigor, many remain only in the report of an experiment, or, as occurs in the curricular component Supervised Internship in Civil Engineering, the student makes daily reports of a follow-up of a work. Thus, the report becomes the main form of writing during the academic process, however, it is only one of several types of texts, or textual genres, that the student, after graduation, should have mastery in his professional life.



On the other hand, the teacher of the course has specific technical training, with the same bases, that is, during his graduation, he attended basically the same curricular components that he is now teaching. The Civil Engineering course must follow the National Curricular Guidelines (DCN) of Engineering, which had its promulgation on April 24, 2019, through Resolution No. 2, which presents the various competencies that the graduate should develop, throughout their training, among them, analyze and understand the physical and chemical phenomena of symbolic models, design and develop new structures and solutions to problems, as well as communicate effectively in written, oral and graphic form, being able to express properly.

The training of the teacher of the Civil Engineering course, in its majority, consists of masters and doctors who seek scientific technical improvement in their areas of activity, however, the greatest challenge of the teacher is to have pedagogical bases for a teaching learning of quality, innovative and with new pedagogical practices, which unfortunately, it does not happen with the teacher of higher education, who usually has his knowledge base in his initial training and becomes a content teacher, causing banking education (FREIRE, 1987), with the student in the totally passive role and without a deeper interaction with his learning.

Therefore, the challenge of the Professor is to adapt and be able to go beyond Calculus, Physics, Chemistry among others, but to help in the critical and reflective development of students, as well as to teach the various textual genres that the student will use as a professional.

GOAL

Therefore, our challenge with this research, which comprises an excerpt from a doctoral project of the Stricto Sensu Graduate Program in Education of the University of São Francisco, is to investigate the continuing education of the professor of Civil Engineering, regarding the work with language. Developing an environment conducive to the teaching-learning process of students. And the teacher? Is he prepared for this environment? Is there pedagogical training? Does the teacher organize the environment for the student to develop, in order to constitute a space of knowledge? Based on the perspective of Sociodiscursive Interactionism, in this work we will address the textual genres, commonly worked in the Civil Engineering course, as a teaching object, since the dedication of the teaching work are, in a certain way, the calculations, thus making a more technical training, without any concern with social interaction and reflective critical development, since the future engineer must communicate and be able to argue efficiently and effectively, both oral and written in the various spheres of professional activity.

From the perspective of Lea and Street (2014), for academic literacy it is necessary to be clear that, when working with literacy in the university, there are relations of power, authority and identity, which generate tensions, conflicts, disputes. Thus, teaching a textual genre means raising the position that those who produce it at the university gain and, at the same time, realize that learning, of this genre, can be quite



tense for the learner, because it can imply ways of acting, speaking, behaving very different from what the student already knows (ZAVALA, 2010). In addition, in this perspective, the theory of the student's deficit is discarded, that is, that the lack of knowledge of textual genres or ways of acting in the university would be his responsibility. We defend the proposal that the university (and each course in particular), as a sphere of activity, needs to work with the texts and ways of acting that are important for both academic success and professional training.

Given these difficulties, we verified the need to identify the relationships of students of the Civil Engineering course with language. In the same way, to verify and identify the relations of the Professors of the Civil Engineering course with the language. To this end, we must analyze the development of relations with the language of the Professor of the Civil Engineering course, in an Extension course of Academic Literacy.

Thus, following as a baseline the didactic engineering "that articulates the instrumental reason linked to the possibilities for the development of the language of the new technologies with the educational reason" (DOLZ, 2016).

Starting from these premises, we have as a central focus of this research, to identify the relations of Civil Engineering students with language, from the textual genres, due to the various forms of approach and the diversification ways of the Professor to work these different formats of texts in the classroom, thus involving the teaching and learning of the curricular components, not being, initially, easy to understand by students, especially freshmen, because it is expected that the student has knowledge of textual genres that should have been worked in high school.

To meet our objective, we must identify the relations of Civil Engineering students with language, as well as identify the relations of Civil Engineering course professors with language, first, from a specific questionnaire for teachers and another specific for students, in order to verify which textual genres are of prior knowledge of students and which were developed during their academic life, as well as, which textual genres teachers use during the teaching and learning process.

Identifying these relationships, we will be able to analyze the development of the relations with the language of the professors of the Civil Engineering course, in an extension course of academic literacy.

And so, we will be able to reflect on the possible ways to provide didactic-pedagogical bases for the teacher to properly organize the teaching and learning environment, in addition to contributing to their work, being able to act on these genres in a more grounded and conscious way of didactic development.

In order to carry out this research, we adopted the theoretical framework of Sociodiscursive Interactionism of Jean-Paul Bronckart (2009), articulated to the discussions of Didactic Engineering of Schneuwly and Dolz (2004/2013) and to the studies on Literacy of Kleiman (1995, 2006, 2007).



Sociodiscursive Interactionism (hereinafter ISD) is assumed as an extension of the studies of Social Interactionism, especially Vygotsky's research, thus defending the importance of interaction/socialization and semiotic instruments for human development. Social Interactionism can be designated as a general epistemological position, found in several currents of philosophy and the Human Sciences in works by authors such as Buhler (1927), Claparède (1905), Dewey (1910), Durkheim (1922), Mead (1934), Wallon (1938), and Vygotsky (BRONCKART, 2009).

According to Vygotsky (1869-1934), in "The Social Formation of the Mind" and "The Construction of Thought and Language", it is through socialization mediated by semiotic instruments that higher mental functions, such as language and memory, develop. Thus, in order to better understand the human way of acting, it is necessary to pay attention to the semiotic instruments, especially the word. Starting from the studies of Vygotsky and also relying on other authors, such as Habermas, Saussure and Volochinov, Bronckart (2008) defends the importance of concrete texts, exemplary of the various textual genres, as an important starting point for us to better understand human action.

According to Bronckart (2009), in the course of man's evolution, thanks to the progressive releases of biological and behavioral restrictions and the development of language, the capacities of thought and consciousness that contribute to the autonomy of the species were built.

The specific characteristic of ISD is to argue that language is the central and decisive problem to deal with human development, especially the morphogenesis of actions. For this, it is necessary to study the written or oral texts produced. As Bueno (2007, p. 58) states, "any text can contribute to the clarification of actions and to the construction of 'models of acting', or to the development of their characteristic forms and structures in a given socio-historical moment".

In this way, when interpreting a text following the perspectives of ISD, we interpret the model of action that it contains. According to Bronckart (2004 apud BUENO, 2007, p. 58):

It is in language, in written or oral texts, through interpretative figures, that the interpretation of acting is constructed, since, being arbitrary and conventional, linguistic entities have the property of absorbing the representations constructed by humans in their direct relations with the world and transforming them into common or public representations.

For ISD, the text assumes central importance and it is always an exemplar of a textual genre.

METHODOLOGY

The main objective of this research is to identify the training of the Civil Engineering teacher in relation to the work with language, in order to elaborate a didactic sequence, later, it can help engineering teachers in the training of future engineers, to communicate effectively in oral and written form.



To achieve our goal, we will initially make a questionnaire for students and teachers, in order to raise which textual genres are worked. Later a conversation circle with the professors of the Civil Engineering course, to discuss the results of the questionnaires and raise the points to be worked on in the extension course to be offered to the professors of the course.

In the present research, we will first analyze the results of the questionnaires and later, the result of the extension course, considering the theoretical methodological framework of ISD, which provides for the analysis of the production context and textual architecture.

"It is through the genres that language practices materialize in the activities of learners", according to Dolz and Schneuwly (2004, p. 71), researchers from the University of Geneva, affirm that the idealization of this concept of gender, from the school perspective, evidences its use as an instrument of communication, in certain social aspects, in addition to being an object of teaching and learning. Still according to these same authors, they define the textual genres as mega-instruments, being mediators between the subjects belonging to the spheres of human communication activity and a reference to learners. Finally, the mastery, on the part of the student, occurs by the development of the autonomy of reading and textual, oral and written production, as a direct consequence of the mastery of the functioning of language in social communication events.

According to Bronckart (2009, p. 103), the appropriation of genders "is a fundamental mechanism of socialization, of practical insertion in human communicative activities." Therefore, the subject must develop language skills so that the mastery and understanding of text production occurs, consequently, of the textual genres. These language capacities can be broken down into three, which are articulated with each other:

I. the capacity for action, which is related to the production context and thematic content; for Bronckart (2009, p. 99):

[...] Describing a language action consists of identifying the precise values that are attributed by the producing agent to each of the parameters of the context to the elements of the thematic content mobilized. The agent constructs a certain representation about the communicative interaction in which he is inserted and has, in principle, an exact knowledge about his situation in space-time; Based on this, it mobilizes some of its declarative representations about the worlds as thematic contents and intervenes verbally.

According to what Bronckart explains, the subject is situated in relation to the context in which the genre was produced by the capacity for action, having thus constructed a representation about how to place oneself as the author of the text, of the socio-historical context, of the social place in which it was produced.



II. The discursive capacity indicates the concern with the textual plane of each text, taking into account the types of discourse and sequence belonging to a given genre. These types of discourses are defined as follows, according to Bronckart (2009, p. 149):

Linguistic forms that are identifiable in the texts and that translate the creation of specific discursive worlds, these types being articulated among themselves by enunciative mechanisms that give the textual whole its sequential and compositional coherence.

Among the relations that are established with the discursive worlds, according to Machado (2005), "it is currently considered that there are four types of basic discourse: interactive, theoretical, interactive report and narration".

Bronckart (2009) points out that the sequences can be characterized as: dialogal, explanatory, narrative, descriptive, argumentative, injunctive and other forms of planning, such as schematization, being the exposition of something without the intention of arguing and convincing someone, and the scripts, which is to report to the recipients some fact making a chronological cut of it, whose effect intended by the enunciator is represented by each of them.

III. The linguistic-discursive capacity being responsible for the mastery of grammatical structures and functions within a given genre, considering the textualization mechanisms (connection, verbal and nominal coherence), in addition to the enunciatives, making the coherent text represented as linguistic resources.

The definition of "text", for Bronckart (2009), consists of common characteristics of every unit of language production, having characteristics in common. The author also calls a textual leaf its hierarchically superimposed organization, consisting of three layers:

I. General infrastructure of the text: in a textual organization, it is the deepest level, organizing the approach of the general action of explicit language of the text. Relating the following aspects:

- a) the thematic content;
- b) the types of discourses;
- c) the modality of articulation between these discourses;
- d) the sequences that appear in the constitution of the types of discourses.

II. Textualization mechanisms: they aim to provide thematic coherence through a hierarchy of articulators that enable the linearity, logic and temporality of the text. Contain the elements:

- a) Connection, being textual organizers that can be applied to the general plan of the text, to the transition between types of discourses, etc.;



- b) Nominal cohesion, especially the elements that constitute the processes in the textual space;
- c) Verbal cohesion, consisting of elements that maintain the temporal and/or hierarchical organization of processes (states, events, action).

III. Enunciative mechanisms: maintain the pragmatic coherence established in the text. Listed in this layer are:

a) enunciative positioning and the voices of the text, encompassing the intentions of the producer, the conditions of production and the situation of reception of the text;

d) modalizations, which are the evaluations formulated on some aspects of the thematic content, evidencing the intentions of the text. Modalizations are subdivided into;

d.1) logic, which consist of judgments about the truth value of the stated positions, being presented as certain, probable, improbable, etc.;

d.2) deontic, which evaluate what is enunciated under judgments of social values, where facts are presented enunciated as socially permissible, prohibited, necessary, desirable, etc.;

d.3) appreciative, where the most subjective judgments are reflected, pointing out the facts stated as good, bad, strange, etc.;

d.4) pragmatic, where judgments are introduced about an angle of responsibility of a character in relation to the process in which he is a participant, having as main the capacity for action, the power-to-do, the intention, the will to do and the reasons, the should-do.

Starting from the ISD framework, didactic proposals were developed on how to carry out the teaching of textual genres in order to lead students to appropriate different models of texts necessary for the various interaction situations in which they engage in their school and extracurricular life. Researchers such as Joaquim Dolz and Bernard Schneuwly (SCHNEUWLY; DOLZ, 2010) propose that the teaching of genres should be organized from didactic models of the genres and, subsequently, from didactic sequences.

Based on the assumption that the engineer will communicate through texts and, in this way, must resort to a textual genre, to be successful, there is a need to master its production context, its textual infrastructure, its textualization mechanisms and its enunciative mechanisms. Thus, the school should assume the teaching of genres as part of its training activities, according to Bronckart (2009), and also Dolz and Schneuwly (2010).

Taking into account that the genres worked during the civil engineering course are little explored and the form of teaching often does not contemplate a deepening of the theme, the work with the production situation must be prepared and organized so that the texts are studied in depth at their thematic level, that is, covering the subject and considering the bases of the fundamental architecture of the text, where the textual infrastructure, the textualization mechanisms and the enunciative mechanisms are worked, as already



seen. Thus, it is essential to make a didactic model of the genre and, after that, to elaborate a didactic sequence in order to teach the textual genre to the students.

The student should develop his language capacity so that there is the understanding and production of the proposed textual genre (BUENO, 2011, p. 42). For Dolz and Schneuwly (2010, p. 52), it is necessary to "evoke the skills required for the production of a genre in a situation of determined interaction".

This work can lead to the development of language skills, that is: a) the capacity for action, referring to the action of language, contemplating the physical context, the socio-subjective context, in addition to the knowledge of the world, mobilized in the textual production from its contents; b) the discursive capacities, from the discursive variant, allow to manage the textual infrastructure, taking into account the selection that is made of a discursive variant, in the form of textual sequencing and the elaborations of a content; c) the linguistic-discursive capacities, which are operations of use of discursive resources, in such a way that they allow to explain the great hierarchical, logical and temporal articulations of the text, in view of the recipient, and to clarify the enunciative responsibilities and the evaluations that the enunciator makes on the contents (management of voices and expression of modalizations) (MACHADO, 2002 apud BUENO, 2011, p. 42).

DEVELOPMENT

From the theoretical methodological framework of Sociodiscursive Interactionism, the textual genres worked in the course will be addressed, being fundamental the analysis of the production situation, the textual infrastructure (global plan of the thematic content, implications of the author and types of sequence), the mechanisms of textualization and the enunciative mechanisms.

For the study of the textual infrastructure, the following should be considered: the global plan of the text, the global sequence that eventually organizes it, in addition to the types of discourse and sequences. When analyzing the mechanisms of nominal cohesion, it is essential to identify the components that delimit the area to be described placed in the text and how the representations about them are being constructed in the development of the thematic progression, according to Bronckart (2009).

The mechanisms of connection will be analyzed taking into account the fundamental role in the text plans both in the phase of sequences and in the types of discourses, having the importance of organizing the parts of the text as to time and space.

As for the analysis of the enunciative mechanisms, according to Bronckart (2009), we will verify the mechanisms of enunciative accountability in general, whose degree is marked by a large number of linguistic units, such as the marks of person, place, space, insertion of voices, modifiers of the statement, subjective or adjective.



Also, according to Bronckart (2009, p. 330), "modalizations have as their general purpose to translate, from any enunciative voice, the various comments or evaluations formulated regarding some elements of the thematic content". Thus, there is the explicitness of degrees of truth, necessity or subjective evaluation with which the enunciative instance assumes this content in the text, on the enunciated proposition.

Through the work with textual genres, we have the expectation of taking the student to a much better level of production and understanding, if considered the development of language skills. For this to occur, the teacher must have resources that make this development possible, using as a tool the didactic model and the didactic sequence.

The didactic model of a genre consists of a systematized study aiming to know its predominant characteristics, which will guide its teaching. From the genre that we will work, we will verify the objectives of this work as to the practices and content to be taught. Based on the needs of working with students, taking into account language skills and based on the expectation that one has in relation to the development of the student is that the didactic model becomes essential for the teaching of a genre. In this way, the entire textual structure must be known, so that, when analyzing the text, the central characteristics are raised. Therefore, to teach gender, a didactic model must be built, knowing its entire structure, which includes the linguistic and textual characteristics, also considering the students' ability and difficulties to work with texts of selected genre and the teaching/learning experiences derived from official documents (DOLZ; Schneuwly, 2010). Based on these principles, the didactic interventions are defined and the didactic model is built, allowing to define the objective of the genre that will be taught taking into account the level of the students, being possible also to organize the categories in a sequence, which should be explored.

From the definition of Dolz and Schneuwly (2010, p. 83), the didactic sequence is "a set of school modules systematically organized around a language activity within a class project, which aims to help the student to better master a genre of text, thus allowing him to write or speak in a more appropriate way in a given communication situation". For the didactic sequence, the starting point should be an initial production, which will have the function of guiding the didactic sequence made from a communication situation. Then, the students should be confronted with the problems of the genre treated in a more particular way, through modules, ending with a final production, thus constituting the class project.

Teachers should work three stages of adaptation of the didactic sequences to the needs of the students, namely:

(a) Analyze the students' productions according to the objectives of the sequence and the characteristics of the genre; (b) choose the activities indispensable for the continuity of the sequence; (c) to



foresee and elaborate, for cases of failure, a deeper work and differentiated interventions with regard to the most problematic dimensions. (DOLZ; SCHNEUWLY, 2010, p. 94)

The proposal of the didactic sequence, with a teaching instrument, according to Dolz and Schneuwly (2010), when formulated in modules of activities, becomes a more advantageous systematization, with adaptability due to the diversity of communication situations and classes.

The development of the didactic sequence takes place in stages, the first being the construction of representations of the communication situation, when producing an initial text. Afterwards, there will be the stage that involves the content, being presented to the students in the given communication situation. The regulation instrument is provided to the initial production, as well as the first contact with learning, where the first communication situation will be built. From the initial production, the language abilities are known, as well as the potentiality of the students, based on which, the didactic sequence should be defined. The development of this initial production can be simplified, not necessarily be a complete work, because the intention is to regulate the didactic sequence and also be able to define the language capacity, to be developed with the proposed gender study.

In order to ensure an efficient guide for the teacher, as well as an effective work tool for the student, the principles for the elaboration of the didactic sequence should be followed, and should include: a) adequate communication situation for the insertion of an initial production; b) the preparation of content already foreseen; c) the structuring of an appropriate textual infrastructure; d) the early verification of probable changes in the abilities of students; e) education organized in order to achieve the desired transformations; f) teaching strategies and activities designed to achieve the objectives; g) in order to achieve the desired objectives, propose the actions developed along a strategic path.

FINAL CONSIDERATIONS

In this excerpt of the doctoral project, we seek to identify the teachable dimensions of the textual genres worked and developed in the civil engineering course, in order to elaborate a didactic sequence, based on Didactic engineering, which can later assist engineering teachers in the training of future engineers. With this objective, our research was guided by the following question: "What is the importance of language in the work of the professor of the Civil Engineering course and in the formation of the student?"

The research project can help the continuing education of the teacher, especially in the areas of oral and written communication, leading the teacher to contribute to the student, as to the work with texts, considering that the graduate should prepare documents such as reports, memorials, work diaries, minutes, letters, requirements, statements, rules, regulations, among others, in addition to being able to communicate orally in the interaction with clients, with other engineers, with the most diverse professionals. In this way, this project aims to contribute to the continuing education of teachers in areas that they did not have contact



with during their training, whether in undergraduate or graduate studies. Considering the text as the way of acting and the various spheres of action, the work with the teacher becomes important aiming at the improvement in the way of teaching and, as a result, the improvement of the writing of the graduate.

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