

Writing to learn in two disciplines: negotiating knowledge-construction and extending teaching-time*

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Abstract

In the last decades, the links between writing and learning have been widely studied. In higher education, researchers have focused on students' productions, on their standpoints towards writing in different disciplines, and on the complex relations between subject contents and writing practices, among others. However, teaching practices that intertwine writing and disciplinary contents have received scarce attention. This work emphasises two key aspects of teaching practices related to writing to learn activities: teaching time and responsibilities in knowledge-construction. A multiple case study was conducted with two first-year courses, one in Linguistics and the other in Biology. These classes were offered in two public universities in Argentina. Data collection techniques included, mainly, classroom documents, class observations and semi-structured interviews with students. Focusing on class observations, this paper shows how the teaching time was extended by intertwining teaching practices with writing as a learning tool. In both courses, writing extended class-time when students had the opportunity to write outside the classrooms and to discuss what they wrote in whole-class discussions. Additionally, these uses of writing helped students and professors to share, in a more symmetrical way, the responsibilities towards knowledge construction.

Keywords

Teaching practices – Disciplinary contents – Linguistics – Biology – Teaching in higher education.

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Escribir para aprender en dos disciplinas: construcción conjunta del conocimiento y extensión del tiempo didáctico

Resumen

En las últimas décadas, los vínculos entre la escritura y el aprendizaje han sido ampliamente estudiados. En la enseñanza superior, en particular, los investigadores se han centrado en las producciones de los estudiantes, en sus puntos de vista respecto de la escritura en las diferentes disciplinas y en las complejas relaciones entre los contenidos de las disciplinas y las prácticas de escritura, entre otros. Sin embargo, escasas investigaciones se centran en las prácticas docentes que entrelazan la escritura y los contenidos disciplinarios. Este trabajo analiza dos aspectos claves de las prácticas de enseñanza cuando se escribe para aprender: el tiempo didáctico y las responsabilidades en la construcción del conocimiento. Los resultados forman parte de una investigación didáctica diseñada como un estudio de casos múltiples en dos disciplinas universitarias (Lingüística y Biología). Los casos estudiados pertenecen a dos cursos de primer año impartidos en dos de las principales universidades argentinas. Las técnicas de recolección de datos incluyeron, principalmente, análisis de documentos, observaciones de clase y entrevistas semiestructuradas con los estudiantes. En este sentido, centrándose en las observaciones de clase, este trabajo muestra cómo se amplió el tiempo de enseñanza en esos cursos al entrelazar las prácticas de enseñanza con la escritura como herramienta de aprendizaje. En estas clases, la escritura prolongó el tiempo didáctico en la medida en que los estudiantes tuvieron la oportunidad de escribir fuera de las aulas y de discutir lo que escribieron dentro de ellas. Además, esta práctica ayudó a estudiantes y profesores a compartir, de manera más simétrica, las responsabilidades vinculadas con la construcción del conocimiento.

Palabras clave

Prácticas de enseñanza – Contenidos disciplinares – Lingüística – Biología – Didáctica del nivel superior.

Introduction³

What happens with the teaching-time and the knowledge-construction when one writes to learn in university courses? This paper seeks to characterise the ways through which writing, both as a learning object and a teaching tool (MOLINA; CARLINO, 2019), affects the management of teaching-time and the distribution of knowledge-construction responsibilities in two Argentine university courses: Linguistics and Biology.

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The epistemic function of writing has been profusely studied in recent decades. Many researchers have delved into how writing can be used as a knowledge-constituting tool when teaching different disciplines and at different educational levels. On the one hand, Anglo-Saxon authors have been pioneers in investigating reading and writing in higher education. These works go against teaching paradigms that conceive writing as a basic and general communicative skill. This research departs from the idea that students' difficulties in reading and writing are not merely the result of individual deficits or failures in previous instruction (BAZERMAN et al., 2005). Far from it, studies carried out in the framework of "Writing Across the Curriculum", "Writing and Reading to Learn" and "Writing in the Disciplines" show that reading and writing can be powerful tools that mediate the elaboration of social knowledge (BAZERMAN, 1988), the learning of disciplinary contents (LANGER; APPLEBEE, 1987) and the ways of doing and thinking in the disciplines (CARTER; FERZLI; WIEBE, 2007). These lines of research continue to analyse the challenges of reading and writing at the university level (CONDON; RUTZ, 2012; RUSSELL, 2013; THAISS; PORTER, 2010).

On the other hand, in Argentina, different lines of inquiry dealt with the challenges students face in reading and writing at the university. From a linguistic perspective, diagnostic studies prevail. These works detail students' difficulties to understand and write different academic genres such as scientific articles, reviews, essays, and dissertations (ARNOUX et al., 1996; ARNOUX; ALVARADO, 1997; PIACENTE; TITTARELLI, 2003). Additionally, other researchers have focused on the design and implementation of academic reading and writing courses and/or workshops implemented by different universities with the aim of overcoming said problems (FERNÁNDEZ; IZUZQUIZA; LAXALT, 2004; NATALE, 2004). Some of these works analysed students' written productions to further describe their progress and difficulties (DI STEFANO AND PEREIRA, 2004).

Related to this, but from a different and less widespread approach, there is a set of Argentinian works analysing the teaching situations that occur in the classroom. These action-research initiatives have produced clear results about the teaching conditions that promote learning disciplinary contents through reading and writing (VÁZQUEZ; JAKOB; PELLIZA; ROSALES, 2003; PADILLA, AVILA; LOPEZ, 2007; IGLESIA; DE MICHELI, 2009; PADILLA, 2012). Another Argentinean line of research has focused on students' and teachers' perspectives on writing. Their results highlight the mismatches that often exist between students' and faculty's understandings of the distribution of responsibilities, including who should already know how to write – students – and who should teach how to do it – professors – (ALVARADO; CORTÉS, 2000; CARLINO, 2002, 2007; VÁZQUEZ; MIRAS, 2004). Aligned with this, the research team GICEOLEM⁴ (Group for Educational Quality and Inclusiveness by Taking Care of Reading and Writing in all Subjects) posits that diagnostic studies alone do not provide an adequate insight into the complexity of the social practices of reading and writing in higher education. For this reason, several works have focused not only on the texts produced by the students, but also on what the students

4- GICEOLEM (Group for Educational Quality and Inclusiveness by Taking Care of Reading and Writing in all Subjects) is a research group directed by Paula Carlino (CONICET) and based in the Linguistics Institute of Universidad de Buenos Aires [<https://sites.google.com/site/giceolem2010/who-are-we>].

report about their productions and the challenges they face (CARTOLARI; MOLINA, 2016; COLOMBO, 2018; ROSLI, CARLINO; CARTOLARI, 2013). It is also considered essential to include what happens in diverse institutional settings, with different teachers and teaching approaches at the secondary and higher education level as the object of the study. Thus, this paper explores what happens with the teaching time and the knowledge-construction in the classroom when students write to learn in two disciplines: Linguistics and Biology.

Our theoretical framework is based on Didactics as a discipline that systematically studies teaching practices (CAMILLONI, 2012, SENSEVY, 2011). From a linguistic perspective, we conceive writing as a social practice (BAZERMAN; PRIOR, 2004; BARTON; HAMILTON, 1998; LEA; STREET, 1998; CARLINO, 2005, 2013) and, regarding academic writing in particular, we see it as an argumentative construction (PADILLA, 2012). Thus, we assume that in higher education students need to be taught to perform the discursive and textual practices inherent to their disciplines.

From a didactic perspective, the categories that guided our analysis were the concepts of contract and milieu (BROUSSEAU, 2007) and that of chronogenesis, i.e. the genesis of the didactic or teaching-time (SENSEVY, 2009, 2011). According to Brousseau (2007), the didactic contract is a system of expectations between teachers and students that is based on the knowledge of the discipline at stake. The didactic milieu has a two-fold characterisation: (a) the antagonistic system with which the student interacts; and (b) the cognitive context of the action; this is, students' previous knowledge and experiences. We use chronogenesis or "teaching-time" to describe the evolution of knowledge proposed by the teacher and studied by the students, as it unfolds in the joint action (SENSEVY, 2007).

Method

This was a multiple case study research (CRESWELL, 2007; MAXWELL, 2005; STAKE, 1998) from a didactic naturalistic approach (ARTIGUE, 1990; RICKENMANN, 2006). Our research selected two innovative didactic initiatives that consisted of two introductory university courses offered at two public universities in Argentina. These courses were selected because their teachers deliberately integrated writing into their daily teaching practices.

The Linguistics class is a first-year introductory course to Discourse Studies with a text-production component. It is offered for undergraduates majoring in Linguistics and Literature in one of the leading public universities in Argentina. This 4-hour per week course meets twice a week for a whole year and is delivered by professors with an academic background in Linguistics, Writing, and Rhetoric who are also interested in Pedagogy. During the first semester, students learn about discursive genres, scientific discourse, academic writing and argumentation. They are expected to attend theoretical and practical sessions. Around 200 students enrol each year and attend the theoretical lectures. For the practical sessions, they are divided in smaller groups of 30 to 50 students. During the first semester they learn about several discourse genres, including everyday genres (editorials, news, advertising, short stories etc.) and academic ones (conference papers, book chapters, reviews etc.). During the second semester, they are asked to write

a conference paper related to one of the genres taught during the first semester. They can work alone or in small groups of 2 to 4 students, the latter case being highly encouraged. To support this process, practical sessions become weekly tutorial meetings during the second semester. At the end of the course, students present their paper in a conference organised by the university.

The Biology class is a first-year introductory course for students majoring in Veterinary Medicine, Psychology and Environmental Sciences, among others. This semester-long course is offered by one of the leading public universities in Argentina. Class meets twice a week for three hours. Around 80 to 100 students take the class each semester. The course is co-taught by two professors with an academic background in Biology who are also interested in the reading and writing to learn approach. In this class, students face problem-based writing tasks about biological issues regularly. Therefore, they are often asked to read with the purpose of answering inferential questions and arguing for or against different ideas and understandings. All the questions are aimed at relating biological concepts with practical situations. Students usually read and write at home and share their production in whole-class discussions which take half of the class-time.

Data was collected during one semester. As for the Linguistics course, the conference organised by the university was observed and audiotaped (16 hours total). During this event, students presented and defended their conference papers in front of peers and professors. In Biology, the 27 classes offered during the semester were observed and audiotaped (81 hours total). After a preliminary analysis, 6 classes devoted to a unit on Genetic Expression were selected (18 hours total). These classes were selected because in them students often produced short argumentative texts and rewrote their texts based on professors' feedback. Data analysis was based on Maxwell's (2005) qualitative-interactive design proposal. We analysed class transcripts using two fundamental strategies: contextualisation and codification (MAXWELL; MILLER, 2008), looking for contiguity and similarity relationships among data.

Results

Our results show that in both university courses the intertwining between writing practices and teaching practices influenced not only participants who took the responsibility in knowledge construction, but also how teaching-time was managed. On the one hand, professors and students shared the responsibility towards knowledge-construction: knowledge was not a prerogative of professors, but a joint construction between them and their students. On the other hand, the teaching-time was extended thanks to the inclusion of writing in the classroom because students were asked to write at home and later share and discuss their texts in class. Thus, the joint action went beyond the temporary and spatial boundaries of the classroom. This action was initiated on an individual basis, with each student producing his or her own text, and then continued in the space and time of the classroom, with teachers organising classroom activities around students' written productions.

The extension of teaching-time and the renegotiation of responsibilities towards knowledge occurred in these two cases because some teaching conditions were met. First, in both cases, written assignments asked for argumentative writing. In the Linguistics case, the students had to write as scholars do when producing a conference paper. They also had to present the text in an authentic scientific event. In the Biology case, writing tasks were used to approach and better understand disciplinary concepts. The assignments always prompted students to reason and justify their answers. Additionally, class work was organised around reviewing activities: commenting and debating what was read and written took almost half of the class time. It is worth noticing that the extension of the teaching time that we propose in these cases is not based on just “assigning homework” (CARLINO et al., 2013) or on solely asking students to “manage on their own”. On the contrary, teachers devoted class time to writing and brought it inside the classroom. Thus, all the writing done outside the classroom had a genuine meaning for the students. Writing, in these courses, became a common thread within the classroom and a vertebral axis between the different classes. The second teaching condition consisted of teachers’ reticence and the dialogical nature of their interventions. According to Sensevy (2011), reticence lies in a professor’s voluntary omission of what could or should be said so students would be able to act in an autonomous way. In the Linguistics and Biology classes, professors proposed argumentative writing tasks that posed challenges to students. They tried to hold this challenge through dialogical interventions that returned the problem to the students and sustained it instead of solving it right away.

In the following sections, we present some examples of recurring situations in these two classrooms. The two distinctive situations presented below are: “Defending a text in front of peers and professors” (Linguistics) and “Discussing a text in front of peers and professors” (Biology).

“Defending a text in front of peers and professors” situation (Linguistics)

Since the “class situation” can take many different forms (DAVINI, 2008), in the Linguistics class instead of focusing on what happened in the classroom, we tried to understand how teachers, students and knowledge interacted through dialogue in a key moment of this course: the presentation and defence of conference papers. Therefore, in this case, the “Defending a text in front of peers and professors” situation occurred after students presented their papers in the conference organised by the university. After their oral presentations, they answered questions from the audience. This situation was very important since it was the core of all the work conducted throughout the entire course. The process of becoming authors of their own papers, which took a year of work with their tutors, culminated in this situation. Therefore, students had first-hand experience on writing academically in the discipline community of Discourse Studies and it required not only textualizing certain ideas, but also submitting these ideas to peers’ questions, comments and opinions. In what follows, we analyse a fragment of a post-presentation dialogue.

In this exchange, Ramiro, a student who wrote his paper alone, is defending his work entitled *La alegría y la tristeza en la geografía literaria de Alejandro Nicolau*⁵. He analyses the short stories of Alejandro Nicolau, a contemporary writer from Tucumán (Argentina), whom he managed to interview.

[4] Student 2: So, you establish a relationship, according to what I see, with this Korean author. How do you do it? Why?

[5] Ramiro: Yes, she is a Korean author. There are space and emotions... In our work it was difficult not to fall into psychological interpretations. So, I wanted to establish some comparisons between what I did and what this author states. We didn't want, my alter ego and me [generalised laughter because Ramiro worked alone], to delve into the motivations or the psychic structures from the description of space. On the contrary, [we wanted] to take joy and sadness, two emotions that are among the five emotions deemed as basic in Psychology, but we wanted to make that analysis from a literary standpoint. That is, from the text and the authors point of view, not from a psychological one. Therefore, going back to your question, we compared it with a work coming from literary analysis, moving away from Psychology, that's why [we chose] the Korean author who works from a literary approach.

[6] Professor Silvana: The only thing I would mention is that you have to attenuate a little this establishment of the niche because I believe that, from the Semiotics field and the semiotic analyses of literature, all the approaches take into account the category "space" and make an analysis that goes beyond the psychological one. For example, I am thinking of stories by Ana María Matute, "Pecado de omisión", where the characters are analysed in relation to the spaces they inhabit. And these are frequent analyses from a semiotic perspective. So, your niche, the way you wrote it, is very strict. I think you should attenuate it because it's not that space has not been studied as a symbolic value. From literary theory, space has been studied as a symbolic value. You, of course, give it an interesting and very significant insight. I even wanted you to show me what Méndez writes, which you quote there.

[7] Professor Emilia: There's a slide about it [Ramiro searches in his Power Point and nods].

[8] Professor Silvana: [Observing the student's search in Power Point] Before, before, it should be when you show the references. I want to see what Méndez writes, because it caught my attention when you quoted him.

[9] Ramiro: "Towards a Theory of the Spatial Sign in Contemporary Narrative Fiction". Its a research paper.

[10] Professor Silvana: "Towards a Theory of the Spatial Sign in Contemporary Narrative Fiction".

[11] Ramiro: Yes, yes [looking at his computer and glancing at his notes].

[12] Professor Silvana: Yes, it was just a matter of hedging, nothing more, which I think can be attenuated a little because, maybe from other perspectives, space with a symbolic value has been explored in literary works.

[13] Ramiro: Yes, I mainly wanted to emphasise, let's say, that the symbolic aspect would not be central to my work, but the emotion coming from the symbolic aspect. As I said, it is a kind

5- "Joy and Sadness in Alejandro Nicolau's Literary Geography".

of summary of several things. But it is true that there are works out there that we haven't taken into account.

As it can be seen in the previous excerpt, there is a progression of knowledge based on Ramiro's presentation. Student 2, professor Silvana and professor Emilia intervened asking for more information, offering suggestions and requesting justification. In this situation, professors gave students the possibility of becoming authors and incipient researchers on a discursive genre of their choice by prompting them to take responsibility for their affirmations and for the particular knowledge built around their research. This process was scaffolded in the tutoring sessions during a four-month period. By the end of the semester, each student or group of students delivered between 10 and 15 drafts of their work and all of them were commented on by the professors-tutors. Nevertheless, it was the sole responsibility of the students to improve the content of their works and defend it orally in the conference. This meant that professors had something to teach their students (how to write a conference paper, the characteristics and the execution of the genre), but students had something to show (an original hypothesis around which their research and papers were built). As a consequence, the traditional didactic contract – i.e., the expectations that professors exclusively have and give knowledge, while students more or less passively receive it – was broken and modified: there was a renegotiation of expectations between the content to be taught (professors taught how to write a conference paper) and the exercise of writing practices (students exercised the writing practice in a relatively autonomous way, scaffolded by a professor-tutor).

In Ramiro's example, it can be seen how the student received critical questions from peers and professors. Student 2 asked spontaneously some questions that came to her mind while listening to Ramiro's oral presentation. It is worth mentioning that only a few students had read in advance the papers presented during the conference. Most of them just had access to the abstracts and heard the oral presentations. Faced with this question from his peer, Ramiro assumed the responsibility of substantiating the statements made during the presentation of his work. Ramiro replied to Student 2 that the citation of a Korean author's studies was related to the need to work space and emotions from a literary – and not from a psychological – perspective. Student 2 seemed to be satisfied with Ramiro's answer. At least, there were no cross-examinations that indicated dissatisfaction in this regard. Nevertheless, in turn [6], professor Silvana started to discuss a task related to the academic field: to qualify the statements, to limit their scope and to add some hedging. Silvana thought that Ramiro had constructed his "research niche" too categorically and warned him against the risk of doing so when writing scientific-academic texts. To do this, she explained that space as a symbolic value has been studied in the subject field of Semiotics. In turn [13], Ramiro conceded to what Silvana, his professor, was questioning, but he reaffirmed his position by declaring "Yes, I mainly wanted to emphasise, let's say, that the symbolic aspect would not be central to my work, but the emotion coming from the symbolic aspect (...) But it is true that there are works out there that we have not taken into account". In other words, Ramiro accepted the criticism and thus made a concession, but he also reaffirmed that the original contribution of his paper was not to show space as a symbolic value, but space and emotion as symbols.

In this conversation excerpt, Ramiro defended something more than the niche he had built for his research, he defended his autonomy as a scientific reader and writer. He exercised his authorship: he had chosen the content of a text/paper (the short stories by Alejandro Nicolau) and, consequently, had been able to construct an image of his audience and himself as an author (academic ethos) who had an original contribution to make. Therefore, in this conversation excerpt, we can observe that the traditional didactic contract, characterised by asymmetry in the relations between professors, students and knowledge (BROUSSEAU, 2007; SENSEVY, 2011) gave rise to a new contract in which the teacher certainly knew more about something (conference paper genre) but the student, after having researched and constructed a hypothesis about a genre that he chose, knew more about that particular area of knowledge (in Ramiro's case, Alejandro Nicolau's literary work).

Regarding teaching-time, it was extended since the entire discussion was based on what was read and written beyond the classroom. Ramiro was aware that the conference paper genre is a text written with the intention of being presented orally in front of a quite specialised audience. Therefore, his entire presentation consisted of talking about what he had written, of oralising his findings, and his incipient research process.

This instance of presentation and defence of a conference paper is not certainly a usual example of writing to learn in class. However, it is included in an alternative scenario deliberately sought by the Linguistics professors who use writing as an epistemic tool and as a situated practice in their subject. Working with the students on successive drafts of their texts throughout a semester, giving them the possibility of choosing the content and the corpus of analysis, guiding them in the gradual approach to a new discursive genre, is what constitute these dialogues as authentic: both authors and audience play active roles in the progression of knowledge by asking and answering each other as peers/colleagues. In the following sub-section, we will analyse another situation with writing to learn and the extension of teaching time: the work carried out in the Biology case.

“Discussing a text in front of peers and professors” situation (Biology)

In Biology, the “Discussing a text in front of peers and professors” situation took place at the beginning of all of the observed classes. This is a constitutive and iterative component of this Biology course: an hour and a half is devoted to this situation in every class. After sharing and discussing the written productions they brought from home in small groups, students participate in a whole-class discussion with their teachers and the rest of their peers. Therefore, writing at home makes sense because without that previous work students would not be able to understand or participate in these class discussions. Thus, first by writing and then by discussing the ideas they laid on paper, students in this class are expected to take on a position and justify the relationships they draw when faced with assignments that ask them to associate two or more theoretical concepts and link them to real-life situations. In the following paragraph, students were given a writing prompt to complete at home and in the classroom. They were asked to analyse three short texts with examples of the relationships between phenotype, genotype, and environment.

Activity 5

The following texts describe situations in which the concepts of genotype, phenotype, and environment are implicit. After reading them, do the activities.

[Text 1 and 2 were here].

Text 3

The work of scientists has brought to light many aspects of the role played by solar radiation in the annual incidence of a very high number of cases of skin cancer. If the skin is exposed to sunlight, it will accumulate alterations in the DNA molecule (mutations) which are favoured by the ultraviolet radiation of the solar spectrum. A cell can fall into unbridled multiplication if a mutation transforms a normal gene into a growth promoter or inactivates a gene responsible for stopping cell division. It is also known that an important risk factor is the association between white skin and intense solar radiation. Fair-skinned coastal Australians have the highest incidence of all skin cancers worldwide, while darker-skinned Aboriginal people have hardly ever had any such tumours.

- 1- Identify in each text the types of interactions present: genotype-phenotype; genotype-environment; environment-genotype or environment-phenotype.
- 2- Transcribe three sentences referring to some of the above relationships.
- 3- Indicate, in each case, the type of relationship and describe its components (which concepts would correspond to the phenotype, genotype or environment).
- 4- Why do you think we have not mentioned any case in which the following relationship is established: a phenotype that modifies the environment?

This written assignment starts with an open instruction (reading three texts with certain implicit relationships among them) and then, in sections 1, 2, 3, and 4, it goes deeper into some specifications regarding the rationale of the relationships found. It is an assignment that presents three interconnected real-life scenarios since all of them can refer to the same theoretical concepts. After completing the activities at home, students share and discuss their answers in small groups in class. Each group designates a “spokesperson” who will speak on behalf of their peers in the whole-class discussion. In these types of classroom activities, not only the texts selected by the professors but also students’ written productions become the object of reflection and debate. The following excerpt shows how the professor returns to the source text, the one in the prompt that was intended to get students to construct relevant interpretations through writing, with «careful re-reading» being at the heart of this exchange.

[21] Professor 1: Now, those who read text 3 [she refers to the two groups that she previously appointed to work on text 3], what relationship did you find? It’s the longest one, isn’t it?

[22] Professor 2: Yes, it is long.

[23] Student 3: Yes, here. We found an answer, that skin exposed to sunlight produces DNA mutation, that is an environment-genotype relationship...

[34] Professor 1: Environment...?

- [25] Student 3: Genotype. The environment would be sunlight and the genotype, the DNA molecule.
- [26] Professor 1: What about the DNA molecule?
- [27] Student 3: It is altered.
- [28] Professor 1: If there's something you don't understand about what I am writing on the board, let me know. I am just trying to abbreviate, OK? Ehh... in the sentence, you say that it says [reads] "if the skin is exposed to sunlight, it will accumulate alterations in the DNA molecule (mutations)". Is that the sentence?
- [29] Student 3: Yes.
- [30] Professor 1: Do you agree? What about the rest? What do you think?
- [31] Several students: [inaudible].
- [32] Professor 1: Is it OK? He's talking about an environmental factor, UV rays in particular. He doesn't say it in that sentence, but later the text mentions it. They are the UV rays favoured by the ultraviolet irradiation of the solar spectrum. OK? That's an environmental factor that is directly modifying the genetic material of the skin cells, which are the most exposed. Right? Is that right? [Writes on the board] Well, that relationship is fine. There's explicit mention of the genotype. Any other [relationship] found?
- [33] Student 4: Yes, environment-phenotype.
- [34] Professor 1: [Writing on the board] Environment-phenotype. And in what sentence or where, in which part of the text?
- [35] Student 4: It says here that [reads] "solar irradiation produces skin cancer".
- [36] Professor 1: So it would be the environment...?
- [37] Student 4: Phenotype.
- [38] Professor 1: [Pause]. Do you agree?
- [39] Several students: Yes.
- [40] Professor 1: Does everyone agree that skin cancer is related to phenotype?
- [41] Student 5: So the modification of the DNA molecule is the recipe and the cake would be skin cancer.
- [42] Professor 1: Exactly, exactly. Yeah? Just what is the problem in this particular case? That ultraviolet light is altering my recipe.
- [43] Student 5: Sure, sure.
- [44] Professor 1: Yes? Is it OK? It's making changes in the ingredients, I don't know, in the steps to follow, so when I want to make the cake, I don't get it right.

In this whole-class discussion, students and professors made use of a very frequent task of readers: re-reading the source text to adjust interpretations and constructions of meanings. In this case, they returned to the text to look for clues about the possible relationships that could be drawn between phenotype, genotype, and environment based on the example of skin cancer. This returning to the written material on part of the professor in order to settle the different hypotheses constructed by the students is closely linked to the need to immerse oneself in a topic to obtain more tools to write. The teacher's introduction of this reading strategy impacted the way teaching time was handled. Although Professor 1 began by approaching text 3 in a fairly general way (see

turn 21), as the conversation evolved (with the text in her hand), she guided the students towards more plausible and solid interpretations (see turns 26 and 28, for example). The students immersed in the practice of reading a difficult text, adopted this strategy in their search for opportune interpretations. In turn 41, Student 5 pertinently recurred to a metaphor used in a previous class, while Professor 1, in turns 42 and 44, validated and elaborated the reasoning brought up by the student: the genotype was the information, the recipe of the cake, thus phenotype and environment were the ways in which that particular recipe was carried out.

The knowledge-construction went hand in hand with the professor's questions. The conversational exchanges in this classroom ended up being eminently radial with the professor being at the centre (CAZDEN, 1998). From turn 25 to turn 28, the teacher cross-examined the student, seeking greater precision: "What happens to the DNA molecule?" or, later, she reinforced it with corroborative questions such as "Do you agree?" (turn 38). In a large and heterogeneous first-year class, Professor 1 insisted on involving her students instead of just lecturing about new contents. Professor 1 achieved this task with relative success: it was not only her who included new knowledge in the exchange, the students were also doing it, basically, in two ways: (1) answering Professor 1's questions (turns 23, 25, 27, 33, 35, 37, and 39) and (2) bringing up previous knowledge that would allow them to better interpret the new ones (turn 41). Thus, when Student 5, in turn 41, reflected "In other words, the modification of the DNA molecule is the recipe and the cake would be skin cancer", he was able to show his professor not only that he had understood what he had read and what he was trying to explain, but that he was also able to relate this understanding – those discipline meanings jointly constructed – with others elaborated in previous classes. Student 5 exercised, in turn 41, another frequent reading strategy: relating what is being read with what was read previously, establishing relations between texts, "inter-textualising". Therefore, when Student 5 returned to a metaphor previously used to explain and explain himself what he was trying to understand, he set in motion another aspect of the social practice of reading. Professor 1 understood this movement and resumed it in her following interventions.

In short, regarding reading and writing practices, this exchange essentially sets in motion two reader's tasks: (1) re-reading the source text to adjust interpretations and (2) establishing relationships between this text and others previously read. Thus, in an exchange led by the professor, sustained by her insistent, corroborative and iterative questioning, the students enacted in class a reading practice that highlighted these two fundamental reading strategies. The professor showed the importance of re-reading a text when constructing an interpretation and prompted students to do so in class. She did this precisely by asking them to point out the specific fragments in which they found the relationships between phenotype, genotype, and environment (turns 28, 32 and 34). The students, especially Student 5, stressed the need to establish relationships between this and other readings. The challenge for the students was to find pertinent relationships between phenotype, genotype, and environment with the aim of offering new examples for the relationships between these concepts. In this fragment, we see that the students defended two types of relationships: environment-genotype (turns 23 to 32) and environment-

phenotype (turns 32 to 44). Professor 1 conducted the class, cross-examined at key moments (turns 26, 34, and 36), and encouraged participation when she observed that the proposed relationships (environment-genotype and environment-phenotype) were understood (turns 32 and 44). Despite the radial shape that the conversational exchange took, it was the students' interventions that made it possible for the professor to move forward and validate those students' interpretations that were close to the discipline knowledge at stake.

Conclusions

This paper describes two interrelated but different ways of renegotiating responsibilities towards knowledge construction and managing teaching-time when one writes to learn disciplinary contents.

Regarding teaching-time, in these cases, including writing and reading activities outside the classroom served as amplifiers of the space devoted to joint action in the classroom. When writing was integrated into the teaching practices as an epistemic tool, teaching time was extended: a strong work inside the classroom allowed the students to work independently at home and, dialectically, to use this work to participate in classroom debates. This modification took place, in the cases that we have described, within two situations: "Defending a text in front of peers and teachers (Linguistics)" and "Discussing a text in front of peers and teachers (Biology)".

Concerning the renegotiation of responsibilities towards knowledge construction, a strong emphasis on organising classes around writing prompts allowed teachers and students to work collaboratively and to implement joint strategies to advance knowledge. In this interplay of expectations, professors in both classes preserved the reticence clause (SENSEVY, 2011), so that their students could act on their own. Thus, the traditional didactic contract was renegotiated: neither the progression of knowledge nor the responsibility for its production fell exclusively on the professors, but became a cooperative task among the participants. And this could happen inside the classroom, among other things, because the teachers made it possible – by means of the milieu they configured – for the students to set to work at home, far from the classroom's boundaries. Therefore, the classroom became a forum for debate, a space for dialogue about what was read and written beforehand (DYSTHE, 1996, 2012). This classroom organisation implied embracing a more symmetrical distribution of roles regarding knowledge-construction of each discipline.

In sum, a key issue in the cases we have described here is that "writing to learn" requires professors to place reading and writing activities at the centre of classroom work. In doing so, these practices acquire genuine meaning for their students and allow them to critically take part in knowledge-construction.

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