

Argumentation in texts from a teacher education journal: An exercise of analysis based upon the Bakhtinian concepts of genre and social language

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ABSTRACT

In this paper we analyse argumentation patterns present in a set of texts that were published in an electronic Brazilian science teacher education journal (www.cienciaemtela.nutes.ufrj.br). As the texts submitted to the journal differ regarding to format and characteristics of authorship, our *corpus* involves research reports, essays and recounts of didactic experiences written by scientists, science education researchers, school teachers, popular science professionals and informal setting educators. Based upon a Bakhtinian theoretical framework that emphasises the historical and social character of discursive production, our analyses selected genre and social language as main analytical categories. Argumentation was characterized as in terms of relationships between utterance and features of the social activities and discursive practices they relate to. The analysis described the texts with respect to theme, compositional structure and style and identified discursive markers broadly related to the category of language such as (i) the way the author presents him/herself in the text, (ii) the ways the authors represent and relates to their readers (iii) references made about the conceptual domain discussed in the texts. Results show that several texts share thematic choices and adopt a stance in which teachers' autonomy is valued. Evidences of authors' different socio-conceptual perspectives are more clearly revealed by features in style and compositional structure of texts. For instance, issues of authority are revealed by the status given to methodological considerations, by the ways through which citations are incorporated in the literature reviews and by the description of what counts as a result. Finally, through the examination of the patterns of argumentation more typically present in the texts, we discuss obstacles to as well as possibilities of dialogue and mutual appreciation of contributions made by different author profiles.

KEYWORDS: social language, argumentation, genre, scientific text, teacher education journal

CONTEXT AND MOTIVATIONS

In this paper we analyse argumentation in a set of texts that were published in an electronic Brazilian science teacher education journal.¹ This analytical effort is framed in the context of a broader piece of research that investigates issues concerning authorship and reading of texts published in this journal.

As the texts submitted to the journal differ regarding to format and characteristics of authorship, our *corpus* involves research reports, essays and recounts of didactic experiences written by scientists, science education researchers, school teachers, popular science professionals and informal setting educators. Working from a Bakhtinian perspective, we consider texts written by different authors as inextricably linked

to the contexts of discursive activity they take part in. A first hypothesis is that texts written from different social places reflect different stances towards teacher education, in particular, about aspects such as the relevance of educational research and its potential contributions to teaching, the possibility of integrating actions both in formal and informal education spheres, and evaluations of teachers' formative needs. Another hypothesis, coherent with the idea that dialogism is inherent to language (Bakhtin, 1986), is that texts not only want to say something which is meaningful to teachers, but also have the school teacher as their main interlocutor. This means that, through their texts, authors, on the one hand, update and respond to previous utterances concerning the discursive sphere of teacher education and, on the other hand, anticipate new utterances to follow in the chain of communication with teachers. The recognition that communication does not happen in a vacuum, expressed in the form of these two hypotheses, approximates us from the issue of argumentation and of the authors who have sought inspiration Bakhtin's work to discuss it. After considering their spe-

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cific contribution we propose a scheme to operationalise some of the discursive categories proposed by Bakhtin into a descriptive and exploratory analysis of the argumentative dimension in a subset of the texts submitted to the first issue of the journal. The relevance of the investigation is based upon the assumption that knowledge about the differences and similarities between arguments typically associated to different spheres of communication may not only help mutual appreciation of points of view but also the deconstruction of stereotypes and preconceptions different groups of science educators hold about one another.

THEORETICAL FRAMEWORK

Bakhtin and argumentation

Although Bakhtin does not refer explicitly to argumentation as such, researchers from different fields of knowledge have, increasingly, turned to his work in order to seek for relevant concepts to understand that complex process. Examples, drawn from different fields of knowledge, involve: considerations about ideology and dialogism in a problematisation of the roles of sender and receiver, making it possible to go beyond both communicative and rhetorical dimensions in the pursuit of more ethical argumentation practices, for instance in advertisement (Farbiarz, 2003); characterisations of differences between argumentative styles in academic debates in mainland China and Taiwan based upon analyses of how 'reported speech' is woven into scholars' texts (Yu and Wen, 2004); references to Ducrot's interpretations of the Bakhtinian concept of polyphony (1987), which led to a theory of argumentation in language, in educational and linguistic research. In this paper we take a similar route. We start by examining Bakhtin's ideas about dialogism (Bakhtin 1986) to demonstrate its aptness to tackle the issue of argumentation. We then turn to Goulart's interpretation of the essentially argumentative nature of the utterance and to her suggestion of how categories like genre and social language might throw light on the issue of argumentation (Goulart, 2007).

In his account of the socio-ideological dynamics of language, Bakhtin states that when a person enunciates, he/she does not wish for a passive comprehension which would solely lead to the repetition of his/her saying. On the contrary, he/she seeks for responses that reveal adhesion, agreement or objection to his utterances. Thus, the speaker assesses his/her interlocutor and the importance that both have in the discursive situation in question, in order to shape his/her own discourse (Cohen and Martins 2008).

Goulart's argument (2007) rests on the assumption that a Bakhtinian conception of language would allow the assertion that "to utter (or to enunciate) is to argue", based on two main premises. The first is that language's argumentative nature is inherent to the dialogical principle given that all utterances, understood as links in the infinite chain of speech communication of a particular sphere, are always intentionally addressed to another person. The second premise equates ut-

terances to actions upon others, which means that they are more than statements which indicate understanding, questions or answers (Goulart, 2007). Thus, our choices for words and the structure of utterances are not only dependent on the social situations, immediate and remote, that we find ourselves in, but also oriented toward the interlocutor. Moreover, according to Bakhtin (1986) ideological transformations can be understood as the tension and dispute established internally between the different points of view in utterances exchanged between interlocutors.

Goulart (2007) also reminds us that, according to Bakhtin, utterances reflect specific conditions and purposes of each social sphere of communication through three main aspects: thematic content, compositional content and style. These would be related to the formation of genres. Inherently related to the social fields of human activity and to the intentions of speakers, genres are forms of social action. Following Bakhtin, she relates the concept of genre to that of social language. For him, the stratification of language in genres is connected to the professional stratification of language, defined as social language. In other words a social language corresponds to points of view about the world, forms of its verbal interpretation, object, semantic and axiological perspectives (Goulart, 2007).

Another important Bakhtinian concept that can be explored in connection with that of social language in our analyses is that of social horizon. According to Bakhtin each person has a social horizon that orients comprehension of events and interlocutors and which is impregnated both by features of the social place and characteristics of the audience, even if a potential one. Meaning making entails marks of these social conditions. Also, the dominance of one meaning over another is produced in the process of enunciation itself. Therefore, in our analyses, considerations about authors' social horizon are important in as much as they reveal relevant aspects for understanding the argumentative patterns in the texts of the different science educators who contributed to the journal, namely, how they present themselves to their audience, how they represent this audience in their discourse and how they signify the discursive practice of writing for publication. Social horizon (and social group) are dated constructs, that is, they depend on dependent on particular features concerning time and space. This is particularly important because those constructs are responsible for the introduction of both conceptual and material objects, which will originate not only signs but also the value attributed to their content, in a given social practice (Elichirigoity, 2007, p. 105). From this perspective we may understand the different meanings that publications may presently have for our groups of science educators and speculate about the possibility of them creating new meanings for and new discursive stances towards writing for publication.

Such considerations about the nature of the utterance and its argumentative dimension led us to operationalise our analyses by means of the Bakhtinian categories genre and social

language. Moreover, the category social horizon was also mobilised based upon the recognition that specific professional profiles of science educators may play a role in the forms of argumentation in their texts. Thus, for the purpose of the analysis, argumentation will be construed as concerning stabilised patterns textual organisation, which are typical of socio-conceptual spheres of (professional) activity and specifically addressed to an audience. We expect this theoretical stance help problematise argumentation's discursive dimension and be complementary to other approaches which explore, for example, formal, cognitive or conceptual aspects of argumentation in science education (Erduran and Jiménez-Aleixandre, 2007; Simon, 2008; Driver, Newton and Osborne, 2000; Villani and Nascimento, 2003; Kuhn, 1991).

METHODOLOGY

The empirical scenario

Ciência em Tela is an online science teacher education journal that publishes texts in a variety of formats which include research reports, critical essays, description of didactic experiences and curriculum innovations, and recounts of development and evaluation of teaching materials in five thematic sections. They are: "Contemporary science"; "Research in science education"; "Popular science and informal educational settings"; "School and society" and; "In the classroom". The journal also receives contributions in the form of reviews of educational materials (books, videos, software, etc.) and abstracts of theses and dissertations. Authors and referees for the journal come from different professional backgrounds and may be natural and biomedical scientists involved in basic research, researchers in science education, science popularisation professionals (e.g. journalists), educators in informal educational settings (e.g. museums and science centres) as well as primary and secondary school teachers. The main novelty, however, concerns the request for school teachers' evaluation reports, which not only provide authors with an early feedback from their target audience but also value and legitimate readings that are more strongly representative and identified with the practising teacher's points of view.

Such variety in presentation format, content and contributors' profile attend to two major issues. Firstly, it acknowledges the fact that relevant knowledge for school science takes different shapes and is produced in different spheres by different professionals. Secondly it helps create legitimate spaces of interaction between members of groups of science educators who have few opportunities to interact outside situations where their attitudes to one another are almost predetermined by, or encoded in, their social role. The intention of the journal's editors was to foster mutual appreciation of contributions generated by different science educators and, maybe in the long run, help bring people together to integrate actions developed in both formal and informal educational settings such as universities, schools, museums and science centres, non-governmental organisations.

This proposal is, nonetheless, far from unproblematic as a Bakhtinian perspective on language emphasises the interdependency between social horizons and text production. Therefore in our analyses we explore the hypothesis that texts will reflect aspects of authors' (un)familiarity with text genres related to academic communication, their motivations to write to a teacher education journal and their perceptions on teachers' formative needs. In other words we expect that texts will reflect different aspects of the social/discursive practices author(s) take part in. In particular we wish to investigate the argumentative character of their texts and relate them to aspects of authors' social practices.

The corpus and (some of) its social conditions of production

In this paper we present an analysis of a subset of nine, out of the 14 texts, which were submitted to the first issue of the journal, by invitation. The invite described the journal as an innovative initiative and explained its editorial policy, in particular the involvement of school teachers as referees, and suggested a specific text format (research report, essay or recount of didactic experience) leaving theme choice free. It also asked authors to sign an informed consent form, in which they gave permission for the researcher to analyse their written materials submitted to the journal. All correspondence was electronic. The texts selected for analysis were authored by two scientists, two educators who work in informal settings (hereafter referred to as informal educators), three researchers in science education and two school teachers, and treated a variety of science education related topics.

Research questions

By framing the analyses on the exploration of argumentation in different authors' discourse as based upon the categories of genre and social language, we emphasise aspects concerning discursive intention, theme, composition and addressivity.²

- To what extent do authors' utterances relate to stabilised forms of argument typically present in the professional discourse (social language) that corresponds to the author's social group?
- Is the argumentative character of utterances in texts written by science educators for publication in a teacher education journal made evident by a description of their generic features?

Considering the degree of uniqueness of the discursive setting in which texts originate and the scarcity of studies about the discourses of teacher education, it is possible to argue that, although the research questions do not aim at an explanatory account, they have value in themselves in as

² Addressivity is the utterance's character of being addressed to and constituted by the interlocutor.

much as they seek for a description of relevant features in the understanding of member of different groups of science educators about (i) their perceived contribution for teacher education and (ii) their ideas of what teachers' formative needs are, from a perspective that is both empirically based and theoretically sound.

Principles and procedures of analysis

Texts were read and interrogated from our own social place, namely that of a researcher in science education with previous professional experience in secondary science school teaching, and with respect to categories derived from our theoretical framework concerning characteristics of genres and of social languages involved in the discursive situation these texts relate to. This was done in the attempt to identify dimensions under which the argumentative dimensions of the texts became evident, namely (i) the social nature of the utterance/genre and (ii) the dialogical principle. This was done under four main dimensions which related to aspects of the interlocutors involved in the texts (authors and readers), the conceptual domain discussed in the text and its generic features as outlined in Table 1.

This analytical framing sought to operationalise some parameters that were considered constitutive of social languages by identifying discursive features that can be linked to different professional fields of activity of the authors. According to Bakhtin, elements of a given social language can be integrated in genres (Bakhtin, 1991; Goulart, 2007). In other words participating in a discursive community means to be able to recognise and use a social language and speech genres. In our case we wish to identify aspects of social languages and genres which were mobilised by the authors. The recognition of the social language was made operational through broad considerations about the ways authors presented themselves, how they represented and addressed their readers and how they described the conceptual domain treated in their texts. Furthermore, and following the relationships between genre and social language, we analysed all texts in terms of their generic features. In doing so, we were attentive to the constraints implied, and potentially imposed, by the suggestion made to authors to write a given text type when the invitation was made. However, we did not assume that the texts were exemplars of one genre or another and paid special attention to the ways descriptions available for each of the formats were interpreted and textually realised by the authors. Therefore, the purpose of mobilising categories related to genre in the analysis was to understand relevant aspects of texts as socially constrained productions, not simply classify them as being one type or another.

Other factors which were taken in consideration during the analysis are the relationships between the texts and (i) the demands of the discursive situation that circumscribed the production of the text submitted to the journal, in particular, the nature of the invite and the understanding of the journal's agenda; (ii) aspects of the social practices in which

Table 1. Analytical categories.

Social language	Author	<ul style="list-style-type: none"> - Personal or impersonal stance. - Approach (e.g. problematisation, prescription etc.). - References to specific environments, procedures, events etc. related to a professional practice.
	Reader	<ul style="list-style-type: none"> - Assumptions about readers' previous knowledge. - References to readers' familiar contexts. - Forms of addressivity.
	Conceptual domain	<ul style="list-style-type: none"> - Ontological assumptions. - Epistemological considerations. - Values and axiological orientations. - Methodologies of interpretation and inquiry. - Ways for communicating ideas.
Genre		<ul style="list-style-type: none"> - Theme: thematic patterns, framing, inference bases. - Compositional structure: organisation, division in sections, graphics, length. - Style: linguistic features (lexical, syntactical).

authors participate and that lead to different degrees of familiarity with (academic) writing and; (iii) the nature of the debates and the access to peer interlocutors established in their respective professional environments.

The analysis of the way the author represented him/herself in the text was based upon the examination of references to his/her own professional and/or academic history, as revealed in a short (auto)biographical presentation that accompanies every text for publication, as well as the identification of a personal or impersonal stance adopted in writing. Such elements helped us to discuss how authors locate themselves with respect to the field of knowledge (e.g. specialist or critic) as well as in relation to the reader (e.g. authority or partner).

The analysis of the ways the reader was represented involved the identification of assumptions made about previous knowledge by the reader and realised by explanations (included or absent) in the text, by the amount of detail in the description of contexts and procedures and by textual markers of addressivity such as direct questioning, dialogue, inquiry and persuasion. Moreover, we were attentive to the kinds of discursive activity that the text instigated readers to adopt as, for instance, to receive/acquire information, to reflect upon a given topic or to construct arguments and positions.

References to the conceptual domain were analysed in terms of (i) the ontology of objects and events which were singled out as main topics in the text; (ii) of epistemological considerations concerning legitimated ways of knowing and founding reasons for reliability; (iii) axiological dimensions concerning values and moral; (iv) methodologies, that is, a description and study of the ways inquiry is framed and conducted and; (vi) consideration about the means and purposes of communication within and outside the peer community.

Our interest in argumentation led us to pay close attention to the bases upon which ideas put forward by the texts were founded (e.g. empirical evidence, authoritative statements, references to theories) as well as their textual realisations (e.g. citations, paraphrases, statistical data etc.).

The analysis of the generic features involved the identification of theme, compositional structure and style, for each of the texts. Each one of the three categories was broken down in a number of subcategories so as to guide our analysis more precisely and to provide us with a description of each of the text in terms of its generic features. Theme relates to a specific thematic patterns associated to a given subject and to distinctive ways of framing it, concerning issues which are considered pertinent, or not, and the degree of reliability and completeness of approaches adopted in their discussion (Costa Val, 2003). In the case of the text types we analysed, theme concerns topics related to: (i) teaching and teacher training (e.g. subject matter, methodology, assessment, classroom management, knowledge of contemporary science, educational research trends and results etc.); (ii) education (e.g. objectives, curriculum, learning, policy etc.); (iv) science (e.g. content, interplay theory/evidence, method, reliability, results etc.); (iii) society (attitudes, decision making, funding etc.); (v) technology (e.g. applications, artefacts, etc.). Theme also entails relevant historical and epistemological aspects, especially those concerning means used to justify inferences and conclusions (e.g. analogy, experimental evidence, personal or collective experience, induction, deduction). Compositional structure has to do with typical formats of organisation of a given text. In the case of manuscripts to be published in an education journal they involve considerations about length, division of the text in sections, lay-out, use of graphics, presence of identifiable structures of academic texts (e.g. abstract, literature review, methodology and references) or didactic materials (e.g. questions, suggestions for further reading). Finally, we signified style as concerning choices of linguistic resources, both lexical and syntactical, which included: the use of jargon, technical terms and special expressions; choices for verbal modes and tenses (e.g. imperatives) and; the presence of syntactical structures such as grammatical metaphors. They were documented and discussed in terms of their relationships at different levels in the text (e.g. clause, paragraph, section). In the analysis we sought, specifically, for patterns associated with different discursive practices and discourses (everyday, educational and scientific) such as description, explanation, narrative, critique, analysis, prescription, dialogue, exposition, recapitulation, evaluation.

These parameters were not, of course, identified in all texts. They served the purpose of basic principles that guided our readings. Finally, it is necessary to say that, although there appears to be a suggestion that textual aspects are only pertinent for genre analysis, the analytical framing is realised through textual analysis. This means that inferences about representations of authors, readers and conceptual domain were based upon the interpretation of strands of text. In oth-

er words, they were identified and discussed in terms of recognisable textual features related to style and compositional structure such as, for instance, use of lexicon and lay-out.

ANALYSIS

We start by presenting a summary of the texts selected for analysis and later focus on specific questions concerning generic features and the broad indicators of social languages present in the texts.

Food safety of genetically modified organisms

This essay was written by a female professional researcher who holds both undergraduate and MSc degrees in Chemical Engineering and a PhD in Biochemistry, currently working at a state funded research institution. It starts by stating the role of biotechnology in improving quality and increasing availability of food, especially through recombinant DNA technology. From this conceptual framework, she defines food safety in terms of relevant concepts, like substantial equivalent. She goes on to explain aspects involved in the adequately labelling of genetically modified foods, such as the reliability of different techniques for testing and both national and world-wide legislation demands. She finishes the text stating that, differently to other industrial sectors which develop according to market demands, developments in the agricultural and cattle-raising industry must also be bound to the necessity of providing the general public with scientifically sound information. The text is written in an impersonal style, includes technical terms and explanations that presuppose specialised knowledge in Biology and includes an extensive and up-to-date bibliography in English. It does not establish any explicit relationships between the subject and the school curriculum or classroom practice.

Current trends in nuclear weapon projects

This essay was written by a male university professor and senior member of scientific institutions in Brazil and abroad. He trained as an engineer, obtained a PhD in Nuclear Physics and senior research fellowships in Condensed Matter Physics in international universities research centres. At the time he wrote the text he also taught at initial physics teacher education programmes. His text contains an abstract which serves the role of introduction and contextualisation of the discussion he proposes about the possible growth of nuclear weapon arsenals all over the world. The text starts with references to the destructive power of the Hiroshima and Nagasaki bombs. He mentions initiatives of the international community to control the proliferation of military nuclear arsenals and the (little) impact they had on the political agenda of different countries. The author mentions the weakened role of the United Nations in these matters and the inefficacy of international economical embargoes as a coercion measure over countries which have low HDIs (human development index). The text includes graphical data that compare, for different nations, their Human Development Index, the amounts

which have been invested in research and development and information about the year they started nuclear tests. The conclusion is that, as there are no great technical impediments for a number of nations to acquire the necessary know-how to produce nuclear weapons, a new legal world order that includes countries which were not signatories of the 1968 non-proliferation and that assures their right to autonomy in pacific use of nuclear technologies and, at the same time, guarantees universal elimination of nuclear weapons. The text construes its subject as a science related matter with public concern. It is written in an impersonal and formal style. Passive voice is often used, but there is very little usage of specialised language. Data presented is linked to reliable sources and conclusions are argued on the basis of statistical, historical and sociological information. The text does not explore the implications of the discussion for science education.

Sexuality and teenage pregnancy: opening up perspectives

This recount of experience was written by a female educator who has been responsible for a number of educational projects in non-governmental organisations as well as in extramural university courses. She holds two undergraduate degrees, in History and Journalism, an MA in Educational Technology and, when the text was submitted, was doing a PhD in Social Medicine while carrying on with her professional activity. Her text starts with a personal and chronological account of her experience as an educator in informal settings that leads to the statement of the text's main goal, that is, to show what she has learned about sexuality and gender through these professional experiences. She starts by portraying reasons why a girl becomes pregnant as complex and related to matters which are psychological (the desire to be unconditionally loved by a child), sociological (the lack of professional perspectives in a deprived economy) and anthropological (a ritual of passage from childhood to adult life). Another layer of complexity is brought by references to the underestimation of questions concerning teenage fathers, such as the reasons they are in general unwilling to wear condoms and the impact that pregnancy has on their lives. The text finishes with a statement reflecting the author's strong personal conviction that the questions discussed should help broaden the scope of health educators' agenda concerning teenage sexuality. The text mixes stretches of personal narrative with academic formulations in specialised language (e.g. 'hegemonic masculinity', 'androcentric order'). Many of these terms are explained in footnotes through quotations and paraphrases of research papers and books. Many claims are based upon the authority of personal experience. The pronoun 'we' is often used to indicate that the authors includes herself in the group of educators to whom she writes.

Can we learn science by playing or is science a game? Reflections and (more) challenges for the science teacher

This recount of experience was written by a female Biologist Educator who has an MA in Education and that has worked as an environmental educator in both schools and community projects. At the time she wrote the text she was doing PhD in Public Health and continuing her professional activity as an educator in science museums and science centres. Her text presents the motivations for developing ludic educational materials and strategies in a science museum, describes the artefacts developed and includes a video, photographs and an evaluation of their reception by students and teachers in the museum. The proposals are coherent with guidelines for developing popular science activities elaborated by the museum's educational centre and founded in theoretical considerations about the nature of science and about the connections between ludicity, interactivity and learning. These are realised by means of citations and paraphrases of cognitive psychologists. The text is written in personal style with frequent references to individual and collective aspects of the elaboration of the materials. In some passages of the text, possible criticisms are anticipated and responded by the writer, which clearly shows that the text is addressed to an interlocutor who is capable of raising conceptual objections concerning a possible naivety or simplification in the way scientists are portrayed. Claims made about the quality of the reception by school visitors are based upon references to practical experience, that is, a kind of argument that is frequently present in science teachers' texts (Cohen and Martins, 2008).

Lessons in Botanic:

The literary text in science education

This research report was written by a former school Biology teacher who acquired an MA and a PhD in Education while she worked in schools. At the time she wrote her text, which was based on her PhD research, she had just been started a new job as a university lecturer at a well reputed Faculty of Education where she now teaches Didactics of Biology and Biology Teaching Practice. The text describes "the theoretical and methodological bases, analyses and results of a study that investigated connections between literary and scientific languages, their relationships with teaching and learning and the role of literature in school science leaning". The text starts with the presentation of the literary text, followed by theoretical considerations about the role of language in leaning which were based upon Bakhtinian categories. She goes on describing the empirical scenario, how and which data was gathered as well as categories used in the analysis. The author included information about the staging of a play by students, as well as excerpts of texts and examples of botanic plates constructed by the students. Both are discussed in terms of theoretical categories so as to back up her conclusions about the importance of literature in triggering curiosity and stimulating both teacher and students to search for new in-

formation and to elaborate new readings. The author constructed a text in which the canonical sections of a human science paper were weaved in a narrative of the investigation as it developed in the empirical setting. The style is formal. All theoretical constructs (e.g. exotopy, epistemological obstacle) were fully explained in the text.

A picture to be read...

This recount of experience was written by a science educator researcher who has a Physics undergraduate degree, and an MA and a PhD in Education. She is a university associate professor who teaches Didactics of Physics and an experienced supervisor of science education graduate students. The text contains an epigraph which is a quotation from the lyrics of a Brazilian popular song about possible relationships between science and art. The author starts with considerations about the act of reading and goes on to state the main goal of the text, namely, to describe her personal reading of a picture. The author identifies the painter, her style, the historical context in which she lived and worked, and her views on science, includes a figure showing the painting in question and proposes an interpretation of characters and situations depicted, making parallels between compositional elements in the picture and conceptual relationships in science. The style of the text is formal though there are, at some points, allusions to the oral mode. The text also includes intertexts with other popular Brazilian songs. Coherently with the perspective adopted, the authors' interpretation is presented and justified in terms of cultural background and personal imagination.

Learning: the usual questions, research and teaching

This research report was written by a female senior science education researcher who has an undergraduate degree in Cognitive Psychology, a Masters degree in Psychology and a PhD in Education. She is also an associate university professor. Her text started by presenting her manuscript as yet another text that is addressed to teachers and which deals with the issue of learning. After problematising relationships between teaching and learning, she presents a discussion of traditional views on learning associated to three different spheres: the school, science education research and psychology. She then announces a future text which will follow this one in publication where ruptures with traditional views on learning will be presented and contemporary perspectives will be discussed. The text contextualises views of learning that circulate in each of the three spheres by means of explanations of their premises and references to theoreticians. According to the author the main objective of the text is to generate a reflection about learning, not to offer ready-made answers. The text has an abstract and is divided into thematic sections. The introduction includes a meta-text which describes the contents of the following sections. The style is formal and dialogical in the sense that a number of rhetorical questions, addressing common concerns expressed by teachers about the subject, are included in the text.

Physics and equilibrium

This recount of experience was written by a female experienced Physics school teacher who holds a Diploma in Education. She has both participated and taught in institutional in-service teacher education projects. Her text describes experiences gathered along 30 years of practice which are described as fully committed to the ideal of lifelong learning. Starting by the recognition that students often dislike Physics, the author explains her involvement with a professional development project as an opportunity to face the challenge of changing students' attitudes towards this school subject. She describes pieces of research aimed at developing new teaching proposals and how they were evaluated and modified. She includes quotes of published material she co-authored with other project members and citations of science education literature that explain theoretical and methodological approaches adopted by her group (e.g. STS). The text also includes a video showing the author's participation in a national TV programme designed for broadcasting in schools, photographs of the materials developed being used by students, descriptions of specific activities concerning the topic of equilibrium developed as part of the work of the project and references to museum visits which were integrated in didactic sequences. Finally, she mentions parameters for evaluation of the didactic experiences such as the observation of students' engagement in activities. There is an alternation in the use of the pronouns 'I' and 'we' to signify individual and collective dimensions of her practice. The text mixes formal and informal styles and is clearly addressed to peers. In a few passages there are explicit references to ideas, contexts and experiences which can be easily recognised by practising teachers.

The Internet as an integral teaching activity

This recount of experience was written by an experienced male Biology school teacher who had an undergraduate Biology degree and also worked as software consultant. He holds a Diploma in Science Education and has worked as mentor of beginning teachers. His text begins with an assertion about a view, which he considers to be consensual amongst school teachers, that learning science is hard for students. This is followed by the proposition that computer mediated activities can not only increase students' motivation but also help teachers. The author describes an internet site which he has developed and used as a didactic tool. He justifies design choices based upon orientations from Cognitive Psychology and describes an activity involving online search for information about problems concerning rubbish generated by consumption of industrialised products which culminated with the design of an online newspaper by students. The text ends with comments made by the author about students' accomplishments, especially concerning the development of a critical stance towards the question of waste in society. The text is written in the first person of the singular. Throughout the text, the author emphasises the simplicity of the proposal and

the processual nature of learning. He gives sufficient detail about the development of the activity, in particular, about operational demands generated by the task (e.g. where the internet site created by students can be hosted for free).

Generic features present in texts

The descriptions presented earlier show that, in general, all texts addressed topics which are not traditionally dealt with in initial teacher training syllabi. They emphasised: (i) socio-political dimensions of science related issues which are object of public concern (e.g. the proliferation of nuclear weapon arsenals, food safety of genetically modified organisms, the increasing numbers of teenage pregnancies); (ii) relationships between science and art (working with literary texts and theatre plays in science classrooms); (iii) aspects of the nature of science (the nature of scientific activity, the role of the scientist). Only the school teachers mentioned topics traditionally related to the school curriculum in their texts but as illustrations or contexts of exemplification of their main idea: one dealt with the concept of equilibrium as a nuclear theme in the physics curriculum while the other proposed internet based research as a strategy to motivate students illustrated by an example involving the issue of waste. Another exception was the science educator who chose to discuss learning.

The compositional structure followed a similar pattern in many of the texts. Seven out of the nine texts selected presented an abstract. Only the science educator's text was organised in sections identified with the structure of the typical Human Sciences academic text (introduction, theoretical framework, methodology etc) though the actual headings alluded to contents of the theatrical play used in the activity. With the exception of the texts by the two school teachers, one researcher in science education and one informal educator, all were written in the first person of the plural. We interpreted this choice for the pronoun 'we' in two different ways: as a conformation to compositional features of the academic genre and as an indication that, for the purpose of what was in question, the author included him/herself in the same social group of readers. An interesting difference in the texts concerns the use of visual representations. Graphs and tables were present in the scientists' text as actual pieces of information to be read, which were not replicated in the written text. However, the images (mostly photographs) in the science educator's research report, in both school teachers' recounts of experience and in the recount by one informal educator, played different roles. They attested the actual realisation of the experience, served as illustrations and added to what had already been said in the written text. They also provided some kind of evidence about claims made in the text, especially those which emphasised increased engagement of students' in learning activities.

As for style, we noticed both formal and informal writing in the same text, especially in school teachers' and informal educators' texts. Some of the texts were indeed quite heterogeneous, mixing everyday and elaborated forms of discourses.

That can be an indication of the ways through which both school teachers and informal educators' discourses are constituted by other interlocutors and attentive to the diversity of the real audience (Cohen and Martins, 2008), in this case, school teachers, academics in the editorial board and referees. Furthermore, the dialogic dimension in these texts was made explicit in two main ways: by the citations and paraphrases of academic literature, which had an authoritative character and provided support for some of teachers' stances, and by references to shared perspectives and recognisable situations from teaching practice. We have interpreted elements such as chronology and characterisation of people and events in the recounts of experience allude to the narrative genre.

In general, it is possible to say that differentiated choices for composition and styles depict author profiles that are more or less familiar with the social practice of writing academic texts and who present themselves as more or less implicated in teaching issues.

How do authors present themselves?

References to ways through which authors presented themselves were found in the 150 word autobiography demanded by the journal as well as in the texts. As one could expect from a more constrained kind of text production, the autobiographies followed a similar format and emphasised objective information about academic training, professional experience and current activities. On the other hand, in their texts, some authors included more detailed and qualified information. Differently to the texts written by scientists and researchers in science education, school teachers' and informal educators' texts included personal presentations and explicit references to their academic training and contexts of professional activity. These references were textually realised in different ways. In some cases, they were construed as an introduction to the text but also, very often, were part of the narrative structure. One interesting example is the text of one informal educator which, in its introduction, contains chronological information about educational projects carried out under her coordination in non-governmental organisations as well as references to the direct contact made with large numbers of teachers and students during field work and to the development and products of her MA dissertation. This information was brought again along the text, providing a timeline which not only determined text organisation but also allowed readers to signify how the author's understandings about questions concerning teenage sexuality became more complex and in need of investigations. Another example is found in the text of one school teacher who described aspects of her professional life, giving particular emphasis on her participation in teacher training programmes and, in this way, revealed a great deal of investment in her own professional development.

Texts written by scientists and science education researchers did not include direct or indirect textual marks of presentation except for the text of the science education researcher who reported a piece of research exploring relationships

between literary and scientific languages. She made brief references to the part she played in the empirical scenario of the research reported in the text and included her doctoral thesis in the reference list.

The ways authors made explicit their position toward controversial issues raised in their texts, such as socio-scientific questions (e.g. controlling nuclear weapons), also revealed aspects of their discursive intention. Such positions were textually realised in different ways by different authors. For instance, it was the quality and the relationships established along the text by the scientist author between pieces of information concerning about food safety that supported her position concerning the need for more adequate labelling. In another of scientists' texts positioning were expressed through a more impersonal and authoritative use of the pronoun *one* to indicate indeterminacy ("*one cannot conceive... one must recognise...*") and of the passive voice. For one informal educator, it was the reference, found in the concluding section of the text, to shared beliefs and collective agency in the definition of an agenda for school's responsibilities to deal with aspects of teenage sexuality emphasised by the use of the pronoun *'we'* ("*we believe that the task to convince them...*"; "*questions that matter for us who work in education for health and citizenship...*").

Another way through which authors revealed aspects of their socio-conceptual horizon was through their portraits of teachers' formative needs and of the role of didactic materials. We found an explicit preoccupation to tackle these issues in the texts by school teachers, researchers in science education and informal educators. For example, we found suggestions that teachers should widen their repertoire of didactical resources, descriptions of alternative educational materials (board games) and strategies (internet based research), and explorations of the relationships between art and science through dramatisation and picture viewing. On the other hand, scientists' texts limited themselves to present information without initiating a discussion of the implications of this information for teaching. Nonetheless, in neither case we detected a prescriptive tone. In general, they tried to inform, describe possibilities of activities and to provide, to a greater or lesser extent, subsidies for reflection in the classroom. This choice also reinforces a view in which their readers, that is, schoolteacher, are autonomous and selective.

How are readers represented in their texts?

Searching for textual markers that indicate how authors represented readers in their texts led us initially to the identification of the assumptions they made about readers' interest in the subject. Both scientists and one informal educator assumed readers' interest on the basis of the public importance of the theme. School teachers and one informal educator legitimised their choices in terms of assumptions about teachers' perceptions on students' lack of motivation, unfavourable attitudes and difficulties in learning science.

Although all texts include references to specialised vocab-

ulary, these were more frequent in scientists' texts. A great deal of previous specialist knowledge about science related subjects on the readers' part which was assumed. Nonetheless, this knowledge was compatible with what is expected under the competences of a science teacher. In general, school teachers included explanations, paraphrases and citations to explain concepts mobilised in their texts. References to educational academic literature and related areas, such as Cognitive Psychology, were frequently made through literal citations or paraphrases in all texts, but the scientists'.

One another relevant aspect was the reference to contexts which were familiar to the reader. They were present in texts of informal educators in the form of comments about difficulties of approaching sexuality issues in the classroom, in the science education researcher account of the changes in the classroom dynamics that follow the introduction of alternative didactics resources, and in the informal educator perceptions of teachers' expectations about a museum visit, which included paraphrases of questions commonly asked by teachers.

An analysis of the modes of addressivity in the texts suggested different kinds of discursive activity they stimulate in their readers. For instance, scientists' texts did not present justifications of the pertinence and relevance of the main topic discussed to science teaching. They contained a number of definitions, declarative sentences and addressed the reader as people who must acquire information about a given subject. In other texts readers were encouraged to reflect upon claims made through the presentation of alternative points of view (e.g. that teenage pregnancy is an issue that involves boys as much as girls) and of questions directed to the reader ("*what if we thought that studying science is as fun as playing?*"). Apart from the more dialogic orientation, texts by informal educators and school teachers made reference to concrete instances of classroom activity. In some of the texts it was possible to observe distinct addressivity marks, each one corresponding to a specific interlocutor. This can be illustrated by the following quotes taken from the text by the informal educator who wrote about teenage pregnancy. The first one is a matter-of-fact claim, impregnated of subjectivity, unjustified and written in plain simple language: "*Right from the start of the project it became clear that for preventing STDs, AIDS and unwanted pregnancy in adolescence demands much more the distribution of condoms and the usual lessons on human reproductions in Biology or Science classes*". In the second excerpt, from the same text, the author paraphrases a well known researcher to back up her interpretation that teenage pregnancy may have acquired a different meaning in certain social groups: "*Besides Heilborn [footnote] believes that, especially in groups with a lower social status, pregnancy may represent a 'kind of resemantisation' of the female gift that is conceded to men as part of the strategies for making the union concrete, taking the place of virginity, which is nowadays underrated.*" The use of vocabulary, the style of sentence construction, the inclusion of a footnote with the full reference of the paper from where the

quote was taken and the use of quotation marks suggests that academics may be the privileged interlocutors. Being somebody who is used to cross over boundaries between practitioners and academic communities,³ this informal educator reveals her ability to address both these interlocutors in her text. This choice may have been motivated by her awareness that the submission would be evaluated by a school teacher and an academic.

The texts also revealed diverse choices with respect to the ways conclusions and inferences were justified. Authoritative references to academic literature were present in nearly all texts, including those written by authors who were less familiar with the academic genre. Scientists were more likely to ground their conclusions in evidence gathered from trustworthy sources and reliable statistics. A similar choice was made by researchers in science education, another group for whom empirical investigation and qualitative analyses are part of their professional universe. Texts from these two author profiles, in general, included references to the bases of their claims (e.g. “*graphs and tables show indicators...*”; “*comparisons between ...*”; “*these observations provide evidence for ...*”). On the contrary, texts written by school teachers and informal educators included evaluative comments and qualifications of ideas and experiences reported which were not backed up by data. For instance, claims such as “*this report demonstrates the student's discovery of...*”; “*the motivational aspect of different activities allowed a wider comprehension...*”) that were often unsubstantiated. Different authors' choices concerning the bases of authority of the claims made can also be interpreted as related to binding commitments to the conceptual domain as well as to expectations about the readers.

DISCUSSION AND FINAL REMARKS

Our analyses suggest that textual marks present in the text can be interpreted as evidence of authors' linkage to a given social place. These marks, which are more strongly evident in the compositional and stylistic features of the texts, suggest that different authors made particular claims, which were different with respect to their nature and to the bases of their justification. Scientists appeared to emphasise the commitment to the dissemination of scientifically sound information. Likewise, researchers in science education also privileged the communication of research results. Authors in both groups made references to empirical data, qualitative or quantitative. On the other hand, school teachers and informal educators gave more importance to the description of experiences grounded on their own professional practice. These differences may be partly due to the stylistic impositions of each of the genres that authors produced. For instance, a recount of

experience allows the inclusion of personal narratives whereas an essay tends to be more focussed on the discussion of a topic or of an author. Nevertheless, it is possible to establish relationships between features of these texts and the discursive practices in the different authors' professional contexts. Our analyses did not show, however, a one-to-one relationship between social place and the kinds of argument put forward. That is suggestive of what Bakhtin called plurilinguism (1981), that is, the possibility that a text may contain different social languages. This indicates an exciting prospect that discourses generated in one field of professional activity may cross its boundaries and find their ways into re-significations by other discursive communities.

The analysis also indicates similarities across texts, such as the valuation of topics which are not usually present in initial teacher training programmes and the absence of a prescriptive tone which emphasises school teachers' autonomy. The recognition of these similarities and differences gives may help construct bases for the mutual appreciation of points of view elaborated in different social spheres.

The argumentative character of the utterances was perceived as a kind of “communicative action which has a contextual as well as intersubjective nature” (Cohen and Martins, 2007). They entail influences of the socio-historical discursive context they belong to, as exemplified by references to the educational contemporary debate (e.g. references to STS or to up-to-date statistics concerning human development indicators). The intersubjective dimension is made evident by choices concerning topic as well as compositional and stylistic choices that characterise different modes of addressivity.

These analyses can be extended through an exploration of two other categories proposed by Bakhtin, namely *authoritative* and the *internally persuasive discourse*, which differ with respect to the kind of argumentation they typically entail. Based upon Bakhtin, Goulart (2007) claims that the force of arguments present in authoritative discourses (e.g. religion, politics and moral) rests upon values which are historically and hierarchically constructed, precludes persuasion and demands attitudes such as recognition and assimilation from interlocutors. On the other hand, internally persuasive discourses are strongly associated to the possibility of ideological transformations. They usually involve others' discourses as much as our own in a productive and creative, though often conflicting and tense, process of construction of new meanings which based upon the consideration of other points of view and that leads to the construction of a discursive stance towards. It may be interesting to see whether or not we can find instances of such discourses and their relationships to the patterns of argument in the text.

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