

# TEACHERS' DISCOURSE IN KINDERGARTEN: AN ANALYSIS OF TEACHERS' UTTERANCES IN SCIENCE LESSONS

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## Abstract

This paper studies the organization of teachers' utterances taking into account whether they belong to academic or social discourse, and the pragmatic function that teachers' utterances play within each discourse modality. The data consist of four class hours of video-recorded material obtained during observations of teaching situations in two five-year-old kindergarten groups. One kindergarten belongs to a rural school and the other one, to an urban school. We used qualitative and quantitative data analysis. The results showed that both teachers generated similar discursive contexts in Science lessons. Teachers used more utterances during the development of academic discourse than during social discourse. Within social discourse, the teachers used most of their utterances to issue directives. Within academic discourse, they used most utterances to request information from kindergartners. In this case, the rural teacher and the urban teacher produced similar percentages of utterances for commenting on and evaluating children's responses. Results suggest that it is important to continue studying the pedagogical implications of teaching practices in Science lessons as well as detecting teachers' training opportunities in classroom dialogue and practices that promote the development of scientific thinking in kindergartners.

Keywords: classroom interactions, teacher's discourse, pragmatic function, Science lessons, kindergarten

## 1. INTRODUCTION

This study is anchored in the fields of Interactional Sociolinguistics and Discourse Analysis, in particular, in the analysis of school discourse. In this area, a recurring theme is the need to analyse teachers' discourse in order to observe how the teacher organises the class discursively and, in turn, what the characteristics of the pragmatic and discursive environment that they provide children with are within the framework of classroom interaction. In this sense, the analysis of teacher's discourse acquires particular relevance given that it is the teacher that controls the direction of discourse, decides who talks and when, and he/she is also the one that introduces and finishes topics (Sinclair & Coulthard, 1975). In fact, teacher talk has been of concern to discourse analysis for the past fifty years. As a result, numerous investigations have been conducted in the field. The motivations for undertaking the present study are twofold: first to compare teachers' discourse in urban and rural areas and, second, to replicate and extend previous research in the field developing two systems of categories, namely, academic and social, which describe the pragmatic function of teachers' utterances and, eventually, inform practice.

The theoretical framework is based on the study of teachers' discourse organization in the classroom. This topic has been explored by several authors (see Green & Weade, 1987; Green et al., 1988; Lee & Irving, 2018; Mehan, 1979; Ong, 2019; Sinclair & Coulthard, 1975), among which the classic study by Sinclair and Coulthard (1975) stands out. They analysed the structure of teacher-student conversation and the functions that utterances acquire during teaching interactions. The results of Sinclair and Coulthard's work showed that the teaching exchanges in the classroom have a tripartite structure, also known as IRF. This sequence is made up of an initiation move (I), a response move (R), and a complementary follow-up move (F). Usually, it is the teacher that initiates the exchanges by providing or requesting information; then, a student answers, and, after that, the teacher evaluates or gives feedback on that response.

However, Mehan (1979) demonstrated that teacher evaluation was not always present. Therefore, some teacher-student interaction sequences correspond to the IRF structure and others to an IR structure. In consequence, Mehan developed the category named *topically-related sets*. Within this category, the author identified certain sequential structures made up of basic and conditional strings. At the end of each set, the evaluative component appeared. In other words, the teacher's evaluation was always carried out at the end of the sets and not precisely after a student's response.

Later studies (e.g. Green & Weade, 1987; Green et al., 1988) went deeper into the analysis of teacher's discourse organization in the classroom. These studies showed two types of coexisting discourse on the part of the teacher in the classroom -social and academic- each imposing specific demands on students. These demands co-occur as if they were two interconnected and interrelated texts: a *social text* that contains the implicit and explicit information on how to participate in class, and an

*academic text* composed of the thematic content of the class and the structure of that content (Green et al., 1988). These studies show that following behavioral norms allows teachers and students to focus on the development of thematic information. Thus, accomplishment of social rules in the classroom leads to greater opportunities for academic learning (Green & Weade, 1987; Green et al., 1988).

The following is a review of the literature on the topic organised in terms of studies focused on the pragmatic function that teacher utterances have during the development of academic and social discourse at the different school levels: daycare center, kindergarten, elementary school and high school.

### 1.1 Literature review

Among the studies that analysed interactions with small children in daycare centers, the work carried out in Argentina by Ibanez et al. (2018) stands out. These authors studied the pragmatic features of teachers' utterances directed to infants in daycare centers. The 13 children that participated in the study were between eight and 18 months old and came from low-income families. The authors analysed the linguistic environment that infants were exposed to in two interactional settings: snack time and free play time. Specifically, they studied the frequency of use of pragmatic functions present in two teachers' discourse. For this purpose, the researchers built a corpus made up of nine video recordings following CHAT software criteria for transcribing and coding the data (MacWhinney, 2000). All teachers' utterances were coded for pragmatic function categorizations according to Snow et al. (1975). A second analysis for directives was performed following the proposal of Dalton-Puffer and Nikula (2006). The results of this study showed that teachers talked to infants less during free play time than they did during snack time. Ibañez et al. (2018) also noted that most teachers' utterances were directives aimed at regulating infants' actions in both types of settings (56%), followed by comments (27%) and questions (14%). They performed a comparative analysis of directives and questions, and found that teachers used more utterances that refer to actions, objects or permission requests (77%) than information requests (23%). The findings of this study acquire particular relevance given that interactions are analysed in a sample of Rioplatense Spanish L1 speakers. Addressing the characteristics of linguistic environments children are exposed to in school contexts may be relevant when it comes to designing pedagogical proposals that promote children's development at an early age.

Girolametto et al. (2000) analysed the interactions among teachers and two groups of students -toddlers and preschoolers- which took place in daycare centers in Canada. Specifically, they analysed five types of directives that teachers put into play during the development of two different activities: book reading and playdough modelling. Twenty early childhood teachers who work in the metropolitan area of Toronto participated in this study. For data collection, each of the 20 teachers was asked to choose four children. The 40 toddlers ranged in age from one year old and five months to two years old and nine months. The 40 preschoolers ranged in age

from two years old and eight months to four years old and five months. All children had attended the classes for at least two months before the research. Most of the children attended daycare at least 40 hours per week. All 20 teachers had at least two years of childcare experience. None of the teachers had professional training in infant language development. Fifteen minutes of a book reading activity were videotaped followed by 15 minutes of the play activity with playdough. All interactions were transcribed following the Systematic Analysis of Language Transcripts (SALT; Miller & Chapman, 1992) guidelines. Transcription began at minute five of each activity. All the teachers' utterances and only the children's intelligible utterances were transcribed. Each utterance was coded in order to determine the function of the linguistic input. Three types of directives were considered for analysis: 1) behavioral control (i.e., attention calls, group management); 2) response control (i.e., commands, test questions, yes/no directive questions, choice questions), and 3) conversational control (i.e., yes/no questions, clarification questions). The results of this study showed that teacher directives depended on the type of activity and not on the age of the children. Teachers used more directives aimed at controlling the children's behavior (20%) and responses (59%) in the book reading situation than in the playdough time. In contrast, they made more directives aimed at controlling conversation (56%) during the playdough time. The results of this study reveal the need to analyse the interactions among teachers and children in different situations. In this way, it is possible to identify how the functions of participants' utterances vary according to the type of activity.

Dickinson and Smith (1994) conducted a longitudinal study focused on the social and linguistic precursors to language and literacy development. They videotaped storytelling situations in 25 kindergarten classrooms with four-year old children. All video recordings were carried out in an ecological context. The teachers read a book selected by them and then asked the children different types of questions (recall, factual, and inferential). The 25 videotaped book-reading sessions were transcribed according to the CHAT conventions for language analysis (MacWhinney, 1991). For data analysis, the researchers divided the class into three moments: a) before book reading; b) during book reading; and c) after book reading. Within each, they categorised teachers' and children's utterances guided by the sociocognitive conceptual framework. Utterances were divided into three categories: 1) promoting cognitive challenges, 2) making mild cognitive demands, 3) organising an activity, requesting attention and giving feedback to students. Dickinson and Smith's results showed that the amount of total talk for teachers and children was distributed in similar ways: they observed correlations between teachers' and children's amount of total talk before, during and after book reading. Also, they found that those classrooms which showed a higher amount of total talk were more cognitively challenging. Besides, when there was more talk during book reading, the quantity of organization talk by both teachers and children was higher. The results of this study show the importance of applying methodological strategies that combine an ecological approach to the

object of study and the analysis of categories that describe the quality of interactions that make up the teaching situations at this level.

Unlike the previous study, the work by Harris et al. (2017) was carried out in a structured teaching context. The authors examined teacher discourse during Science classes in four kindergarten groups. The purpose of the study was to analyse the discursive strategies that teachers used during the generation of scientific explanations by children. Science classes in which teachers developed a unit on butterflies and living beings were videotaped. For the development of the classes, materials from the Scientific Literacy Project (SLP) were used; these contain reading and scientific inquiry activities addressed to children. The development of the thematic unit consisted of three groups of activities: pre-inquiry, inquiry, and post-inquiry. For each classroom, they categorised the discourse strategy used by the teacher in every turn of speech she produced. Additionally, discourse strategies present in teachers' turns of speech were grouped into four levels: 1) conceptual questions, 2) exposition of concepts, 3) affirmation responses and 4) non-conceptual strategies. Levels one, two and three were integrated for strategies aimed at promoting conceptual development of the class (*conceptual discourse*), while level four was made up of strategies that tended to control students' behavior (*non-conceptual discourse*). The results of this study revealed that, in every classroom, teachers produced more turns of speech to promote conceptual development (79%) than turns aimed at monitoring children's behavior (21%). Throughout conceptual development, teachers used more interventions with the purpose of asking for examples of a concept (39%), explaining learning objectives (34%) and scaffolding misunderstood concepts (8%). The results of this study evidence the importance of analysing the discursive strategies that kindergarten teachers bring into play with the purpose of scaffolding their students' scientific explanations.

Among the investigations that analysed interactions at primary school, the recent study by Vrikki et al. (2019) can be mentioned. The authors studied the interventions of teachers and students in 28 primary schools located in different areas of England. Teachers were asked whether they had received previous instruction related to classroom dialogue and divided into two groups: those who had received prior training in classroom dialogue and those who had not received prior training. Seventy-two classes were videotaped and transcribed according to the guidelines established by Jefferson (1984). The dialogic movements of teachers and students were analysed during the development of three subjects: Mathematics, English and Science. A category system called Cambridge Dialogue Analysis Scheme (CDAS) was used for the analysis. The system is composed of ten productive dialogic movements and two non-productive forms of dialogue. The productive forms of dialogue were made up of different dialogic movements: elaborations of ideas, clarifications, explanations, justifications and comparisons, among others, and movements that involved invitations to make such movements, for example, invitations to compare different ideas provided by different interlocutors. The non-productive forms were made up of positive evaluations and requests for ideas, opinions and beliefs. In their study, Vrikki et

al. (2019) identified two types of teachers' initiations according to the pragmatic function they accomplished. Registered teachers' initiations had the following purposes: 1) to invite students to elaborate on or clarify the speaker's contributions (28%), and 2) to invite them to explain or justify their stance regarding their responses, predictions or hypotheses (17%). Also, in this work, a small amount of teacher talk was aimed at discussing participation rules during class (11%). In addition, the findings suggested that training in classroom dialogue could have an impact only on those dialogical movements related to explanations, justifications or predictions. However, it would not have an impact on the development of the clarification and evaluation movements. The results of this investigation show the need for teachers to learn, receive training in and apply discourse strategies that promote the development of higher order cognitive processes in children.

In a similar line of research as that of Girolametto (2000), Dalton-Puffer and Nikula (2006) analysed only the utterances that contained directives. The authors addressed how teachers and students used directives during the development of various subjects that were taught in English as a foreign language. For this purpose, they video recorded and transcribed teaching situations in which students between 11 and 18 years old participated in CLIL classrooms in Austria and Finland (fifth, sixth, seventh, ninth, eleventh, thirteenth grades). In both the Austrian and Finnish classrooms, the students and teachers were native speakers of German and Finnish. The 13 teachers were also highly fluent in English. Additionally, five of the Austrian teachers were EFL teachers who were qualified as subject specialists, too. The data collected came from situations where the interaction took place between the teacher and the whole group of students, and also from situations where students worked in groups and pair work activities. The authors carried out the data analysis at two stages. First, they identified the type of register observed in each directive detected in teachers and in students during the lessons, that is to say, if the conversational exchange corresponded to an *instructional register* (centered on the thematic unit) or a *regulative register* (centered on behavioral control). Second, the authors decided whether directives were focused on information or on action. The results indicated that directives configured discursive acts frequently used in the classes studied. Also, they found that teachers' directives were used more frequently in conversational settings with a regulative register (52%). This kind of directives was focused mostly on behavior control (77%). On the other hand, most directives used by teachers during interaction with instructional purposes were centered on requesting information (94%). This study evidences the relevance of analysing the two levels of the interactions that take place in classrooms: 1) a general level that categorises the type of register, and 2) a particular level that describes the function directives perform. These findings reveal that the pragmatic value of teachers' directives (asking for information relative to a thematic unit or controlling children's behaviour) depends on the type of register they are inserted in.

The research reported above demonstrates that an important body of previous research described classroom discourse structure systematically, and teachers' and

students' interventions and their functions at different educational levels: daycare center, kindergarten, elementary school and high school. Most of the studies reviewed address the organization of classroom discourse and the role of teachers' and students' interventions in linguistic and sociocultural contexts different from those in Argentina. In most of the studies reviewed, participants were native speakers of English (mainly), German and Finish.

Also, the literature review shows that conceptualizations based on foundational research are integrated into more updated studies. First, the differentiation between social and academic discourse (Green et al., 1988), though not labelled in the same way, is taken into account by other research studies described above (see Dalton-Puffer & Nikula, 2006; Harris et al., 2017; Girolametto et al., 2000). Second, other classic concepts such as the IRF sequence introduced by Sinclair and Coulthard (1975) have been studied in more recent works such as those of Vrikki et al. (2019).

Furthermore, in previous works, data analysis was carried out using different transcription systems -CHAT, SALT, or conversation analysis by Jefferson (1984). Additionally, most investigations applied pragmatic categories which did not emerge inductively from empirical work but were designed by other researchers (i.e. Ibáñez et al. 2018; Vrikki et al., 2019).

Moreover, the authors reviewed have not analysed the total amount of interventions among teachers and students but have focused on specific aspects of the interactions. For example, they have centered on directives (Dalton-Puffer & Nikula, 2006; Girolametto, 2000; Ibáñez et al., 2018), productive/non-productive dialogical movements (Vrikki et al., 2019), discursive strategies for scientific inquiry (Harris et al., 2017) or interlocutors' utterances produced during book-reading sessions (Dickinson & Smith, 1994).

In addition, prior studies that were not carried out in Argentina involved teachers with bachelor's degrees, and were characterised by collecting data in structured teaching situations. Thus, for example, Dickinson and Smith (1994) analysed the teachers' and students' interactions that took place during the pre-reading, reading and post-reading of a book, and Harris et al. (2017) described the discursive strategies that the teachers put into play during the pre-research, research and post-research instances of the life cycle of an animal.

The literature review reveals the need to investigate, with an ecological design, non-structured teaching situations that take place in Natural Science classrooms in kindergartens whose teachers possess only a tertiary level degree, without qualifications in teaching Science or previous knowledge of the relevance of classroom interaction.

### *1.2 The present study*

The present investigation aims at analysing teachers' discourse generated in teaching situations in Science lessons from kindergarten classrooms in public schools located in Córdoba province (Argentina). One kindergarten belongs to a rural school

and the other to an urban school. Thus, this study intends to find out if teachers in different sociocultural contexts foster similar linguistic and discursive environments during teaching situations. For this purpose, the transcriptions were organised in a standardised format which allowed data analysis in an automated way. Data transcript using standardised format and automated quantitative data analysis make it possible for this research to be replicated and for the results to be comparable with other corpora built according to the same guidelines.

Finally, unlike previous studies which performed an analysis of certain aspects of teacher-student interactions, we carried out an analysis of the empirical information with a holistic approach to: 1) the two types of discourse that interweave across the classes (social and academic), and 2) the pragmatic function of teachers' utterances in both types of discourse. This analysis allowed us to inductively elaborate two systems of pragmatic categories specific to each discursive modality.

## 2. METHOD

### 2.1 *Participants*

As a first step in the selection procedure, seven public kindergartens officially registered in the Ministry of Education of Córdoba were contacted by the researchers working on the project. Afterwards, the educational institutions were visited and informed about the procedures involved in the implementation of the project. From the total of four urban and three rural educational institutions, two public urban and two rural kindergartens agreed to participate in the study. In order to be selected, both principals and kindergarten teachers needed to express their interest in collaborating with the research project. Finally, two teachers and 40 preschoolers -19 boys and 21 girls- took part in the study. The rural school kindergarten was attended by 12 children (five boys and seven girls, average age: five years old and two months) while the urban school kindergarten had 28 students (14 boys and 14 girls; average age: four years old and eight months).

In the public school kindergartens observed, children attend a total of 15 hours per week. The kindergartens are located in the same building as the elementary school. The rural school is located in the countryside, on a road that connects several towns and cities. The schoolyard is bordered by the surrounding fields. The urban school is located in the northeast of the capital city of Córdoba. The neighborhood where the school is located has characteristics similar to those of a village. For the most part, it has one-floor houses and a main street where most of the commercial stores are located.

According to the information provided by teachers in a questionnaire that collected sociodemographic information and data about their qualifications, both teachers had tertiary professional training, without specialization in Science teaching or previous knowledge about the importance of classroom interaction. Both teachers had similar years of experience ( $X = 22$  years)

Sociodemographic information about the children and their families was also collected by means of a questionnaire. Most of the children had not previously attended daycare centers. Their first contact with teachers was when entering kindergarten at four years old, the age at which kindergarten is compulsory in Argentina.

Most of the participating children came from working-class families or those receiving state subsidies. The children who attend the rural school come from families whose parents are involved in agricultural production and animal breeding. The fathers of the children who attend the urban kindergarten are commercial employees or bricklayers, while the mothers are mostly housewives.

## 2.2 Procedure

Two teaching situations were videotaped during the development of the thematic unit called *Animals*, between April and June 2015. Teaching situations that were analysed in this study are part of a bigger corpus (Menti et al., 2015-2018), which is made up of recordings made in four kindergartens located in the province of Córdoba -two rural and two urban ones. The recordings were carried out during Science and Social Studies lessons.

Ethical protocols established by the Ethics Committee of the National Council of Scientific and Technical Research (CONICET, 2006) were followed in this research. Therefore, all recommended procedures for doing research with children were taken into account such as permission to videotape teaching situations obtained from the Ministry of Education of the Province of Córdoba (Argentina) and informed consents by the principals from the participating institutions.

Classes were videotaped by the main author as a non-participant observer. Participants' faces, gestures, gaze direction as well as their position in the classroom were captured on video footage. No prior instructions were given to the teachers on how to teach their classes or interact with the students. However, teachers and students were asked not to look directly at the camera.

### 2.2.1 Teaching Situations

For the purpose of this study, a *teaching situation* was considered as the sequence of conversational exchanges produced between the teacher and preschoolers. A teaching situation is made up of two lessons. Each lesson begins when the teacher and children enter the classroom and ends when the bell rings for the break. In both kindergartens, all lessons were taught in the first language, Argentine Spanish. It is interesting to analyse the pragmatic functions of teachers' utterances during the development of Science lessons because different previous studies showed that teachers used more abstract, unfamiliar, and complex vocabulary in such cases (Baumann & Graves 2010; Lemke, 1997).

### *2.3 Description of the teaching situation developed in the rural school*

#### *2.3.1 Lesson 1*

The class was held in the schoolyard, which has no walls separating it from the fields that surround the school. Before going out to the yard, the teacher and children talked about the rules of behavior to follow outside the classroom. Once outside, the teacher sat on a small chair usually used by the kindergarteners while they sat on the floor. The development of the thematic unit included bird watching, listening to birds' songs and the description of their physical characteristics, their feeding, modes of reproduction and the appearance of their nests. The preschoolers then drew the birds on a poster that the teacher posted on a wall in the schoolyard. Before finishing, the teacher assigned homework consisting in looking for more information about the birds for the next day.

#### *2.3.2 Lesson 2*

The class developed inside the classroom. The children sat on the floor and the teacher, on a small chair, all forming a circle. Several children brought to school nests of different types of birds that lived in the area. They brought a log with a woodpecker's nest, two hummingbird's nests, a pigeon's nest, an ovenbird's nest, and a photo of a lapwing's nest. This particular class focused on the description of the nests and other information about birds children gathered together with their families.

### *2.4 Description of the teaching situation developed in the urban school*

#### *2.4.1 Lesson 1*

The teacher sat next to the blackboard on a small chair normally used by the preschoolers. The children were sitting on the floor. The class was structured around conversations about classifications of animals according to where they live, how they move around and physical features. The teacher systematised that information on a poster put up on the blackboard.

#### *2.4.2 Lesson 2*

Teacher and children were placed in the same way as in class 1. The poster they worked on in the previous class was still on the blackboard. Each child, with their family's help, elaborated a report that contained general information about a particular animal. The teacher selected one assignment at a time randomly. The child who had made it stood next to the teacher and, with her help, presented the main characteristics of the animal.

### 2.5 Data transcription

Teaching situations were transcribed and coded following the guidelines specified by the CHILDES system manual (*Child Language Data Exchange System*) (MacWhinney, 2000). CHAT format (*Codes for the Human Analysis of Transcripts*) was used for transcribing the teaching situations, which allowed data processing with the CLAN program (*Computerized Language Analysis*). Transcriptions were structured in terms of the utterances produced by each speaker. An utterance was defined as speech produced by a speaker delimited by pauses or intonational patterns and which, at the same time, has a specific purpose (MacWhinney, 2000).

### 2.6 Coding and data analysis

For this study, only teachers' utterances were analysed. These utterances were coded twice: 1) according to the type of discourse they belong to (social or academic), and 2) taking into account the pragmatic function that utterances served within each kind of text.

For the type of discourse coding, the conceptual criteria proposed by Green et al. (1988) were adopted. Hence, social discourse was defined as discourse which focused on rules of behavior and requests for attention while academic discourse was understood as discourse about the conceptual matters of the academic unit which is being developed in the classroom. To categorise teachers' utterances according to the type of discourse, the postcode function in CLAN software was used. In this case, the code was added by the researcher at the end of each utterance.

The second part of the coding consisted of categorising each teacher's utterance considering the pragmatic function it fulfilled within the framework of the conversational exchanges during class. In this case, a qualitative method, namely, the constant comparative method (Corbin & Strauss, 2014; Glasser & Strauss, 1967), which privileges the inductive analysis of empirical corpus, was used. A total of 3930 teachers' utterances was coded.

This data analysis process led to the elaboration of a system of categories for each type of discourse. Table 1 shows the role played by teachers' utterances which integrate social discourse. Table 2 presents the categories employed to analyse the teachers' utterances that make up academic discourse.

After the system of categories was elaborated, a code was assigned to each category. Then, all the codes were included in a *.cut* file in CLAN. Through the use of the coder mode in CLAN, each teacher's utterance was classified according to the type of pragmatic function performed during the teaching situation. For this second coding, %spatiers were used as a dependent coding line.

Afterwards, the distribution of the variables under consideration across the corpus was quantified as follows: 1) number of teacher's utterances which integrate social or academic discourse, 2) frequency of occurrence for every kind of function that the teacher's utterances accomplished.

Table 1. *The role of teachers' utterances during social discourse*

Pragmatic function	Definition
Directive	Within the framework of conversational exchanges, the teacher selects a child to carry out an intervention in the class; she explains how to behave in the classroom, requests children's attention or asks them to carry out actions related to the organization of the classroom space.
Commentary	The teacher describes the actions she is doing or will do in the future. This category includes all those activities that do not refer to thematic content.
Feedback	The teacher evaluates actions, attitudes or behaviors produced by herself or by a preschooler.

Table 2. *The role of teacher's utterances during academic discourse*

Pragmatic function	Definition
Information request	The teacher asks questions that are answered with "yes" or "no", or asks children to provide general or specific information.
Commentary	The teacher acknowledges and expands the information provided by a child.
Transition	The teacher organises the thematic structure of the lesson. In this kind of utterance, the teacher notices that the development of a topic or a specific aspect of it has come to an end. Then, she decides to finish the explanations and starts dealing with other content. This type of utterance signals the beginning or ending of a topic in particular.
Feedback	The teacher makes a positive or negative assessment of a child's response.

Afterwards, the distribution of the variables under consideration across the corpus was quantified as follows: 1) number of teacher's utterances which integrate social or academic discourse, 2) frequency of occurrence for every kind of function that the teacher's utterances accomplished.

### 2.7 Coding reliability

One hundred percent of each teaching situation was coded by two different researchers. After that, reliability between judges was calculated using the RELY command in CLAN. This command allows us to calculate Cohen's Kappa coefficient. RELY was run for each type of discourse (social: .88; academic: .95) and for each category system (social discourse categories: .96; academic discourse categories: .94).

## 3. RESULTS

The results of this study are reported in terms of the objectives described above. As regards the first objective, namely, to find out if teachers in rural and urban sociocultural contexts foster similar discursive environments during teaching situations, we analysed teachers' utterances during Science lessons and categorised both types of discourse that interweave across the classes (social and academic discourse). As regards the second objective, we analysed the pragmatic functions of teachers'

utterances in both discourses. This analysis enabled us to compare the results to previous studies.

### 3.1 Development of social and academic discourse: comparison between rural and urban sociocultural contexts

The results that follow meet our first objective, that is, to analyse the quantity of utterances that teachers in different sociocultural environments (rural and urban) devote to the development of academic and social discourse. The comparative analysis of the teaching situations showed that, in both kindergartens, teachers generated similar discursive contexts during the development of the same thematic unit.

If the organization of the teacher's discourse in each teaching situation is considered, Figure 1 shows that both rural (RT) and urban school teachers (UT) devoted similar percentages of their utterances to the development of social discourse (RT: 26% and UT: 29%) and academic discourse (RT: 74% and UT: 71%).

Figure 1. Distribution of utterances used by teachers in each kind of discourse

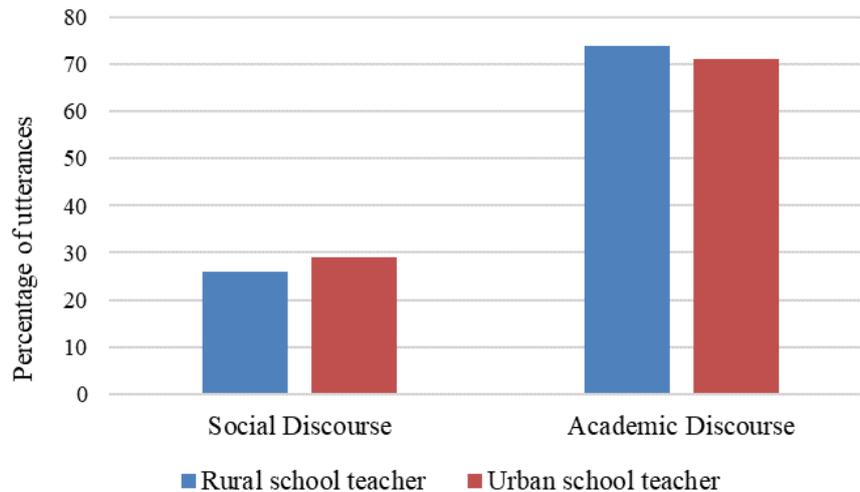


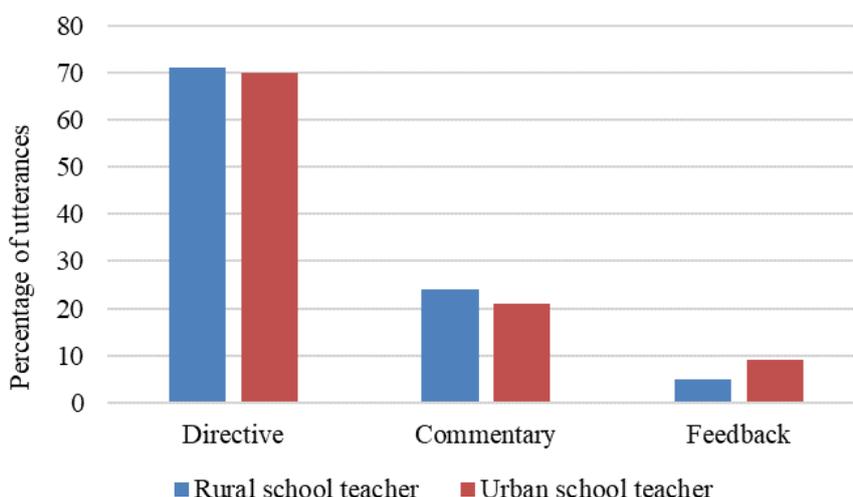
Figure 1 also shows that both teachers used more than 70% of their utterances to develop the thematic content of the lesson.

### 3.2 The pragmatic function of teacher' utterances in each discourse modality: comparison between rural and urban sociocultural contexts

The results presented in this section meet the second objective, that is, to analyse the pragmatic function that teachers' utterances acquire in a rural school and an urban school setting during the development of social and academic discourse.

Figure 2 shows the distribution of the categories that make up social discourse, that is, the proportion of utterances that both teachers used with the purpose of regulating, relating or assessing behavioral patterns during the teaching situation.

Figure 2. Distribution of utterances used by teachers during social discourse



The data show that, in both kindergartens, teachers' utterances were distributed in a similar way in each of the categories that make up social discourse. First, both teachers used most of their utterances to regulate children's attention, behavior and participation (RT: 71% and UT: 70%). Secondly, they produced similar percentages of utterances to relate present or future actions referred to lesson dynamics (RT: 24% and UT: 21%). Besides, in a lower percentage, they used utterances whose purpose was to evaluate their own or children's actions, attitudes and behaviors (RT: 5% and UT: 9%).

The exchange fragments presented below illustrate the different pragmatic functions that teacher utterances acquire during the development of social discourse. The following example shows how the teacher uses directives to organise the location of preschoolers in the classroom:

Maestra: Los quiero ver sentados allá.

Maestra: Mesita número.

Maestra: Ustedes tienen que mirar.

Maestra: Mesita número ((Representa el número siete con los dedos)).

Alumno: Siete.

Alumno: ¡Uno, dos, tres, cuatro, cinco, seis, siete!

Maestra: Bueno.

Maestra: Venga la mesita número siete.

(Los alumnos que estaban sentados en esa mesa se levantan y se sientan en el piso delante de la maestra)

Teacher: I want you to sit over there.

Teacher: Little table number.

Teacher: You have to look.

Teacher: Little table number ((She represents the number seven with her fingers)).

Child: Seven.

Child: One, two, three, four, five, six, seven!

Teacher: Okay.

Teacher: Come to table number seven.

(The children who were sitting at that table get up and sit on the floor in front of the teacher).

The following exchange shows how the teacher explains the action she is going to carry out:

Maestra: Yo los voy a dibujar.

Maestra: Y como no me sale a mí cualquier animal voy a hacer uno que me salga.

Teacher: I am going to draw them.

Teacher: And because I can't draw any animal, I'm going to make one that I can draw.

The following conversational fragment shows how the teacher assesses an action performed by herself:

Maestra: A ver si me sale ((Dibuja sobre el afiche que está pegado en el pizarrón)).

Alumno: Señó.

Alumno: El león como hiciste la otra vez en (.) en el equipo del león.

(...)

Maestra: Ah me salió lindo el león ese.

Alumno: Sí.

Teacher: Let's see if I can do it ((She draws on the poster that is pasted on the black-board)).

Child: Mrs.

Child: The lion as you did the other day in (.) in the team of the lion.

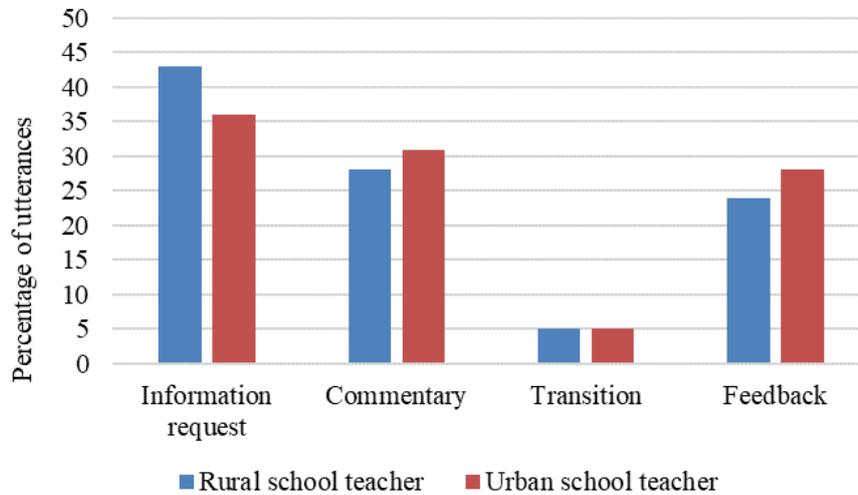
(...)

Teacher: Oh, I made a cute lion.

Child: Yes.

The information in Figure 3 shows the percentage of teacher's utterances categorised according to the function they fulfil when the thematic content of the lesson is developed.

Figure 3. Distribution of utterances by teachers during academic discourse



First, as in the development of social discourse, the results showed that the utterances of both teachers were distributed similarly in all the categories that make up academic discourse. Both the teacher in the urban school and the teacher in the rural school used more utterances to request information from the children (RT: 43% and UT: 36%). Second, both teachers produced similar percentages of utterances for commenting (RT: 28% and UT: 31%) and evaluating (RT: 24% and UT: 28%) the

responses of preschoolers. To a lesser extent, they produced utterances intended to signal the beginning or the end of a topically-related set (RT: 5% and UT: 5%).

The following conversational exchanges exemplify the different pragmatic functions that teachers' utterances acquire during the development of academic discourse. The interactional extract below shows how the teacher requests information from the children:

Maestra: ¿Qué más?

Maestra: Ya encontramos varias diferencias entre los animales.

Maestra: ¿Qué otra cosa puede ser?

Teacher: What else?

Teacher: We have already found several differences between the animals.

Teacher: What else could it be?

The following example illustrates how the teacher acknowledges and expands on the information provided by the children:

Maestra: Este nido (.) ¿de qué está hecho?

Alumno: xxx más grande xxx.

Alumno: Barro.

Maestra: Ba::rro ((*Baja el volumen de voz*)).

Maestra: Barro.

Alumno: Hornero.

Maestra: *Hornero (.) porque se parece a un <horno>*.

((*Enfatiza la palabra*)) para el pan.

Maestra: ¿Vieron el horno de pan que hace la mamá?

Varios alumnos: Sí.

Profesora: *Es muy parecido*.

Teacher: This nest (.) what is it made of?

Child: xxx bigger xxx.

Child: Mud.

Teacher: Mu::d ((*Lowering voice volume*)).

Teacher: Mud.

Child: Ovenbird.

Teacher: *Ovenbird (.) because it looks like an <oven>*

*((She emphasizes the word)) for bread.*

Teacher: Have you noticed the bread oven that mom has?

Children: Yes.

Teacher: *It's very similar.*

The following exchange shows how teachers use transitions to discursively mark the beginning or the end of the treatment of a topic:

Maestra: Le gusta comer carne.

*((Hablan varios alumnos a la vez))*

Maestra: *Bueno.*

Maestra: *Nada más.*

Teacher: It likes eating meat.

*((Several students speak at the same time))*

Teacher: *Well.*

Teacher: *Nothing else.*

Finally, the last fragment exemplifies how the teacher evaluates the response of a child positively:

Maestra: ¿Los halcones?

Alumno: Sí.

Maestra: ¿Qué comen?

Alumno: E::h (.) animales muertos.

Maestra: *Ajá.*

Teacher: Hawks?

Child: Yes.

Teacher: What do they eat?

Child: E::h (.) dead animals.

Teacher: *Aha.*

#### 4. DISCUSSION

The present work originated in the following research question: How do teachers in two different sociocultural environments (rural and urban) organise Science lessons discursively in kindergartens in Córdoba (Argentina). In order to answer this question, two specific objectives were proposed 1) to categorise and tally teachers'

utterances according to the type of discourse they represent (social or academic), and 2) to categorise and tally the pragmatic function that teachers' utterances serve within each discourse. This analysis allowed us to inductively elaborate systems of pragmatic categories specific to each discursive modality.

If the first objective is taken into account, the results presented in Figure 1 showed that both teachers structured the teaching situations on the basis of the interweaving of two discourses. Social discourse focused on the interactive organization of the participants and on behavioral norms. In contrast, academic discourse focused on the development of the conceptual contents of the thematic unit. As in the studies by Green and her collaborators (Green & Weade, 1987; Green et al., 1988), it was observed that the type of pragmatic function depends on the type of discourse. This means that each discursive modality has specific pragmatic purposes. Through social discourse, the use of pragmatic functions that meet the particular requirements of the discursive modality appeared in teachers' utterances. For example, social discourse is used for teaching children how to participate and behave in class, so, pragmatically, teachers' utterances' purpose is to direct attention, organise space and classroom activities, and evaluate children's actions and behaviors. During the conceptual development of the thematic unit, teachers' utterances aim at requesting information, expanding the information provided by children and evaluating their responses positively or negatively.

In agreement with previous studies carried out in sociocultural environments different from ours (Harris et al., 2017; Vrikki et al., 2019), it was observed that the teachers in our study devoted most of their utterances to developing the thematic content of the lesson rather than regulating, reporting or evaluating actions, attitudes or behaviors during the teaching situation.

As regards the second objective, the data in Figures 2 and 3 reveal both similarities and differences with the studies reviewed. If the categories that make up social discourse are considered, the data showed that most of the teachers' utterances were directives oriented to control the behavior or attention of the kindergarteners. These results are in line with those obtained by Dalton-Puffer and Nikula (2006), who analysed classes of English as a second language. They observed different teaching situations during the development of three subjects in primary and secondary classrooms located in Austria and Finland. In other words, they analysed subjects and levels of schooling different from those registered in our corpus. Despite these differences, the results of both studies showed that teachers used more than 70% of their utterances to control children's behavior or attention.

If the categories that make up academic discourse are considered, our findings showed that the teachers who participated in our study used, on average, the same percentage of utterances to request information as the teachers of kindergartens in the United States (39%) (Harris et al., 2017).

Likewise, the kindergarten teachers in our research devoted average percentages of their utterances to making comments to daycare assistants which are similar to

those reported in the study carried out by Ibañez et al. (2018) (29 % vs. 27 %, respectively).

When considering the teachers' evaluations, it is important to highlight that the studies reviewed analysed only teachers' positive feedback. In our study, both positive (21%) and negative (5.5%) evaluations were included. Beyond these differences, the teachers observed in this study used, on average, more utterances for the purpose of positively evaluating children's responses than their counterparts in the United States (15%) (Harris et al., 2017) as well as primary school teachers in England (14%) (Vrikki et al., 2019).

From the observation of the video recordings, we noticed that the two teaching situations analysed took place in different sociocultural contexts and with different dynamics. Thus, for example, the teacher at the rural school taught the first class in the schoolyard and the other did so in the classroom. The theme of their classes focused on birds that they observed directly in the context of the situation. In contrast, the urban teacher developed the entire teaching situation inside the classroom. The thematic content was supported by information on different animals that the children did research on at home with their families' help and brought to the classroom as homework. It is important to highlight that, even though both teaching situations took place in different environments and with different methodologies, the results showed that the two teachers generated similar discursive contexts.

A possible interpretation of these results could be that both teachers have tertiary professional training, without specialization in Science teaching or training related to the importance classroom interactions during the teaching and learning processes. As suggested by Vrikki et al. (2019), the use of specific pragmatic functions present in academic discourse would be related to individual teachers' experience. Thus, these authors propose that those pragmatic functions which seek to promote scientific reasoning in students depend on having received training in the relevance of dialogue in the classroom or not. On the other hand, pragmatic functions, such as expansions and evaluations, would not depend on teacher training but on the contingency requirements of the interaction.

In that sense, it is important to highlight that the curricula by the Ministry of Education of Córdoba province establish the general themes teachers have to teach to their students during Science lessons but do not give them pedagogical tools to apply that knowledge or preparation as regards how teachers' discourse shapes classroom interactions with preschoolers. Harris et al. (2017), for instance, collected the data during the implementation of a specific programme for Science teaching in kindergarten classrooms, but, in our study, the teachers developed Science lessons without any specific training related to how to teach Science in kindergarten.

In contrast to the research mentioned above, in the present study, we categorised transitional utterances that teachers used to indicate the beginning or the end of a *topically-related set* (Mehan, 1979). Teachers used this type of utterance to organise the thematic structure of the lesson. As observed by Mehan (1979), the interactions between the teacher and the students were organised in interactional

sequences that were more extensive than the tripartite IRF format. That is, teachers tended to initiate interactions by asking questions with the purpose of requesting information from children. Then, several comments were exchanged, followed by feedback, either positive or negative. This dialogic organization showed that evaluations do not always occur immediately after the first response from the child. Once the teacher notices that the development of a particular aspect of the topic has finished, she makes an utterance indicating the end of that topically-related set. Generally, these utterances occur after the feedback.

Furthermore, background research demonstrates that both the questions asked and the comments made by teachers promote children's linguistic and cognitive development (Ard & Beverly, 2004). It is also important to analyse the utterances that make up social discourse because, through them, preschoolers learn when and how to participate in the lesson. As Mehan (1979) argues, in the framework of interactions, children learn to participate with their teacher, with their peers and with the group in general. These results are particularly relevant in our context given that most of the children observed were beginning their second year of formal schooling at the time of recording. In addition, these children had not previously attended day-care centers or nurseries.

These results could have important pedagogical implications that inform teaching practices. First, they reveal the need to incorporate theoretical content and practice opportunities that help teachers in teacher training institutions organise the development of their Science lessons. Second, these findings show that it is necessary to train teachers in the value that dialogue acquires in the classroom. In this sense, it is important to learn and implement discourse strategies that promote children's scientific thinking at this level.

As regards future lines of research, this study points to the need for forthcoming research to expand our analysis and address children's interventions as a complement for the analysis of teachers' utterances. Another area for further research could address what happens when a teacher is moving between academic and social utterances for various reasons in order to analyse how they fit together. It would be interesting to explore the reasons for doing that and how that affects the teaching situation.

It should be emphasised that these results should not be generalised as they do not statistically represent the urban and rural environments of schools in Córdoba, Argentina. These findings, however, may be taken into account in future research with the aim of establishing comparisons with other kindergarten classrooms or with different grades of elementary school. It may also be vital to consider other aspects that were not considered in this work, such as utterances that teachers used to develop vocabulary, which could eventually have an impact on the teaching and learning processes.

In conclusion, the two objectives proposed at the beginning of this study have been met. The inductive elaboration of the two systems of categories enabled us to identify and describe the pragmatic function that teachers' utterances performed

during the development of each discourse modality: social or academic. Likewise, this study enabled us to ponder the characteristics of the discourse environments that children who are speakers of Rioplatense Spanish are exposed to during the development of the same thematic unit related to Science in an urban and a rural kindergarten.

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## APPENDIX: TRANSCRIPTION GUIDELINES

::	vowel lengthening
/	rising intonation
\	falling intonation
(( ))	no lexical phenomena
()	comments of authors
CAPITAL LETTER	emphasis
= =	overlap
(.)	brief pause, less than 0.1 second
<0.5>	long pause (in seconds)
(www)	inaudible
(doubtful)	doubtful fragment
¿ ?	interrogative intonation
-	interruption
[ ]	start and end of the gesture, respectively
[*]	error