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Communicative Behaviour Retrospective Patterns Among Students During Lab Practice

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ABSTRACT

The aim of this work is to detect the existence of communicative interaction patterns among Biology students during lab practice. This, based on the analysis of the conversations held among them. Observational methodology was used. An iterative and detailed category system thoroughly was developed as an observation tool, and was later put through a process of re-categorization. A total of six sessions were observed; each one lasting one hour. The intercessional sequential analysis was used with the aid of the program SDIS-GSEQ. The results show that it is highly important for the students the use of question-answer (IAE) in its different modalities: first, in probability of occurrence, are the categories of Persuading and Proposing, the next significant sequential probabilities are: Evaluating, Confirming, and Confusing; followed in sequential occurrence order by: Arguing, Classifying, Correcting, Clarifying, and Suggesting. Last in sequential inhibitory occurrence are: Creating an Opinion, Directing, and Evaluating. These are the particular ways in which students encourage participation during lab practice, opening their minds to their classmates' feedback, leading to questions and answers that create new discussion topics and increase learning opportunities.

Keywords: Learning, evaluation, patterns behaviors, categories, SDIS-GSEQ program.

INTRODUCTION

Student-teacher interaction is one of the main ways in which we learn. In classroom practice, this interaction takes on a special role as it is both a way of learning and the object of study of pedagogy. The first works of research regarding interaction and learning from a socio-cultural perspective based on the description of typical classroom interaction patterns were conducted by Barnes (1992), Cazden (1988), and Mehan (1979). One of the first descriptions was provided by Sinclair &Coulthand (1975). They describe what turned out to be the basic unit of classroom interaction: the IAE (Intervention, Answer and Evaluation). It is the teacher's duty to obtain information (I) from every student, to determine if each one of them knows the material. This is accomplished with a previously known question-answer to which a brief answer (A) from the student is expected. The teacher then proceeds to evaluate the student (E) with common phrases, like "Okay", "That's correct" or "No, that's not okay". After completion of a sequence with a determined student, the teacher is expected to begin a round of follow-up questions directed to the same or a different student. Many subsequent investigations regarding classroom interaction have revealed the ubiquity of the IAE pattern in Western education, from pre-school to college (e.g., Barnes, 1992; Cazden, 1988; Gutiérrez, 1994; Green & Dixon, 1993; Mehan, 1979; Nystrand et al, 1997; Smagorinsky& Fly, 1993).

Aside from describing the common speech patterns in the classroom, this research group has tried to establish links between the IAE language use pattern and the development of language.

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It was Kelly Hall (1988) who, in a study of speech in basic classroom linguistics, revealed how the use of IAE often favored the teacher's control over the interactions instead of favoring the understanding of the whole topic. In the same way, Barnes (1992) found that the frequent use of the IAE pattern of interaction didn't benefit complex means of communication between the teacher and the students. It was the teacher who decided who would participate, when there could have been better feedback had the decision been taken by the student. Barnes reached the conclusion that the extended use of the IAE heavily limits the students' chances to speak with their own words and test their ideas regarding the topic, and, in general, to be more competent during their Language classes.

In what looks like the most thorough study of classroom interaction to this date, Nystrand et al. (1997) found that in eighth and ninth grade English classes, in the U.S. the use of IAE worked very poorly within the learning process. In all classes where the IAE pattern was used, it was found that students were less capable of remembering and understanding the actual topic, in comparison to those students who participated in more complex interaction patterns. Besides, it was found that the use of the IAE pattern prevailed among inferior grade classes. This made the author comment on the significant disparities in the students' opportunities to develop complex knowledge and intellectual skills. The latter leading to the question about the link between IAE and student communication in the classroom.

Although most of the research regarding classroom interaction has been carried out mainly on Language courses, some recent studies have confirmed the ubiquity of the IAE pattern in Foreign Language courses and have highlighted their learning limitations. For example, Hall (1995) found out that the teacher uses the IAE pattern more often with junior-high students.

Lin (1999a, 1999b, 2000) presents similar results on his study carried out on English classes in Hong Kong. Just like Nystrand et al. (1997), Lin found that the IAE interaction pattern happened more frequently in classes formed mainly of low socio-economic levels. Aside from limiting the students' learning opportunities, Lin states that, "It took away from them every chance of developing a real interest in the study of English as a language and culture for communicative and socio-cultural purposes" (2000, p. 75).

In an attempt to discover the specific links between classroom interaction and learning, Wells (1987) decided to give a closer look to the three main components of the IAE pattern. While his classroom interaction observations revealed an enthusiastic participation of the students in class discussions, his first analysis shed light on what seemed to be an important number of IAE sequences. After a closer look, however, subtle changes were found in the standard pattern, especially in the third part. More specifically, it was found that when the teachers question the students, they tend not to close the sequence with a limited evaluation of their answers. Quite on the contrary, a follow-up by them is often required, asking the students to create or clarify concepts, taking the students' answers as a valuable contribution to the ongoing debate.

Wells (1987) reached the conclusion that when the third part of the IAE sequence contains a teacher's evaluation (E) to the students' answers, the pattern severely limits their learning opportunities. Nevertheless, if, in the third part, the teacher favors the continuity of the students' answers, making them think, clarify their opinions, commenting on someone else's contribution, or linking the new knowledge with their personal experience, there's a chance of them improving their learning through interaction. Therefore, he concluded that the typical three-part pattern in classroom interaction is not completely good or bad. It depends on the kind of approach by the teachers and the feedback from the students. From the above, here is

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considered important to understand the use of IAE among students to perform the task, Nassaji and Wells (2000) offer a deeper analysis on the different options of the parts that conform the IAE. Data comes from a six-year research project in which nine elementary and middle school teachers were involved, along with three college researchers.

This project's main focus was the teachers' contributions regarding the third part of the sequence. It was found that teachers who evaluated the students' answers instead of encouraging them, tended to decrease student participation. On the other hand, teachers who invited their students to enrich their initial responses opened the door to a new debate and new learning opportunities.

In this way, whenever the students' contributions were limited to short answers to the teacher's questions, classroom interaction was not likely to lead to active participation and complex communicative development. On the contrary, student participation would be limited to simple tasks, like memorizing, listing, and labeling. Nevertheless, when the teachers' questions and comments are open, and the students can make significant contributions to the interaction, not only do they answer the teacher's question, but they also create a more efficient learning environment.

Purpose

The objective of this research is to detect IAE communication patterns with the use of SDIS-GSEQ among Biology students during lab practice.

METHOD

Participants

The study group was formed by third semester Biology students from Universidad Nacional Autónoma de México. The admission criteria for participants were as follows: a) Being regular Biology students at the University, b) Interest in becoming part of the study group c) Being enrolled in the third semester of the Biology career.

Tools

Two video cameras and two microphones were used as recording tool to guarantee the best accuracy possible regarding data collection. The two cameras along with the two microphones were installed in the classroom where the study group met. According to the ethical rules approved by the American Psychological Association, the students knew they were being filmed and were pointed out the exact location of the recording devices, which were carefully and discretely placed according to the furniture distribution in the room with the aim of minimizing unnatural reactions from the participants.

The computer program SDIS-GSEQ (Bakeman&Quera, 1992,1995)which includes two advanced computing systems as its initials suggest – was also used for this project. On one hand, the SDIS provides a standardized, general format to the sequential data, and on the other, the GSEQ provides a strong description and analysis of the sequential data.

The SDIS-GSEQ is based on an analytical technique developed by Bakeman (Bakeman, 1978; Bakeman y Gottman, 1989) and by Sacket (1980,1987) inspired by the background laid in the work of Bakerman and Dabbs (1976). Two perspectives then emerge: prospective (contemplating the "forward" sense, just as the behavior occurrence is produced) and

retrospective ("backwards" sense) that provide us with a speculative image of the behavior pattern, which allows us to contemplate both aspects of sequential diachronic intensive design. The observation tool, just as it is perceptive according to the observational methodology standards, was appropriately developed in the way of a category system along with a field format. With the aim of the category systems adjusting to the exhaustiveness and mutual exclusivity (E/ME) requirements, the development of the tool initially involved the transcription of all verbal/vocal emissions of the participants, and later completed with incidental notes taken from the observation of the recordings. A lengthy process of verbal dimension categorization was then initiated; this process resulted in an important number of different versions of the tool, which were progressively adjusted towards congruence between the name and content of each category and the E/ME conditions (Arias iPujol, 2003). The result was a tool in which 8 dimensions and a total of 19 categories were articulated. All the categories were defined separating the category nucleus and the level of openness or plasticity, and examples as well as counter-examples of the recordings were extracted for each one.

Once the tool was developed, it was put through a re-categorization process, consisting of a category regrouping for each of the eight field format dimensions. The final version being the following: Negotiation= (Persuasion PERS, Proposition PROPOS), Intentional= (Argumentative, ARGUM Control & Suggestion SUGES) , Recapitulation = Reminder, RECOR Recovery, RECU) Acceptance= (Conditioned, CONDI) , Correction= (Confirmation, CONFI and Imposition IMPOS) Response= (Value VALOR Evaluation, EVAL and Formation FORM) Question= Information, INFO Clarification ACLARA and Confirmation CONFI) Instruction= (Direction, DIRE Correction, CORRE, and Description, DESCR)

Procedure

To reach the aim established, observational methodology has been used, which is supported by the spontaneity of the behavior being studied and the regular environment in which the lessons took place. The observational design (Anguera, Blanco y Losada, 2001) to which this work is adjusted, is /ideographic/ tracing / multidimensional (I/T/M). To reach the purpose, the application of the delay sequential analysis was planned, in order to detect de possible existence of behavioral patterns. The sequential analysis stands out as one of the most appropriate techniques for the analysis of data obtained from human interaction studies. It is a type of microanalysis. It was developed by Sackett (1979,1987) from the work of Bakerman and Brown (1977). There are numerous publications in different ambits, like sports (Gorospe, Hernández-Mendo, Anguera y Martínez de Santos, 2005), space analysis (Pérez-Tejera, Valera y Anguera, 2011) clinical psychology (Roustan, Izquierdo&Anguera, in press), or human communication (Gimeno, Anguera, Berzosa y Ramírez, 2006) as in this case, being the interaction of the college student during lab practice.

RESULTS

Since the objective of this work is to detect the existence of possible patterns of behavior in communicative interaction among students during the lab, through conversation analysis, technical analysis is the inter ideal sequential data analysis. This analytical technique proposed by Bakeman (1978) and Sackett (1978, 1979), and widely used in the scientific literature over the last quarter century, aims to detect the existence of stable structures of behavior that have a higher probability of occurrence than only the expected from the effect of the random act.

Upon selecting delay sequential analysis adjusted residuals excitatory (P> 1.96) and inhibitory (P <-1.96) in R1 to R5 delays (see Table) found that the criterion behavior generates an association PROPOS consistent with PERS, and other alternating with PROPOS and CONF, following the criteria behavior ARGUM and SUGES a linear pattern at delays 1, 2 and 5 PERS is

place and then generates PROPOS. At delay 1 and 3.The criteria behaviour SUGES has a significant positive relationship with the delay PROPOS 3 and CONFI in the delay 4. So the criterion behaviour RECOR significant predictive alternation RECU, CONF, ACLARA is observed alternately IN delays 1,3,4 and 5, respectively, in the same sense, the behaviour given RECU, alternating with EVAL predictive sequences are observed and ACLARA at delays 1 and 4 on. In predictive behaviour given CONF alternation is observed with PERS, RECU, RECORD, EVAL delays 1, 2, 3, 4 and 5. The criterion VALOR behavior shows a statistically significant inhibitory conditioned behaviour regarding FORM, indicating that delays 1 and 2 it never will generated by VALOR. Subsequently positively related VALOR, CONFI and EVAL respectively, delays 3, 4 and 5.

The EVAL category-criteria is positively related to CORRE, EVAL and ARGUM at delays 1,2, 3 and 4 and statistically significant inhibitory manner FORM and RECO in delays 1 and 2. The next category is WAY criterion relates predictively with INFOR, FORM, VALOR, CONF ACLARA and at delays 1 and 5 respectively and EVAL in delays 1 and 2 statistically significant inhibitory manner. Below is the category criteria INFOR is positively related to PROPOS FORM and delays in 1,2 and 5 and the delay in DIRE 4 inhibitory probabilistically negative way. Then the criterion this category DIRE positive sequential prediction INFO conditioned behavior, and DESCR CORRE 1, 2 and with DIRE INFO probabilistically how negative inhibitory delays 2 and 5.The penultimate category CORRE criterion is presenting a significant predictive relationship with CONFI, CORRE, CORRE in DIRE and delays 2, 3 and 5 last respectively. The DESCR category to discuss is presenting a significant positive relationship with DIRE at delay 5.Based on these results is that it is important for students to use the Question-Answer (IRE) in its various forms, the first categories by significant occurrence are, Persuade and Propose the following position significantly probabilistic occurrence are: Form and evaluate, and significantly following are succession occurrence; Confirm, confuse, inform, argue and directing. Finally, the categories are probabilistically negative occurrence that are inhibitory; Report, Assess, Evaluate and directing. You are the particular ways in which students encourage their participation during the course of his practice at the laboratory, opening the contributions of their colleagues who invite them to expand or clarify their answers to initial questions and further discussion, and provided more opportunities for learning.

We agree with Wells (1987), who look more closely at the three parts of the IRE pattern found an enthusiastic student participation, widespread in class discussions, and concurs with what appeared to be a significant number of IRE sequences. Upon closer inspection he found subtle changes in the standard IRE pattern, especially in the third part. More specifically, he found that when teachers ask students and do not close the stream with a limited assessment of student responses, there is greater participation.

In this sense the work of Coll and Onrubia (2001) presents a series of discursive strategies and resources used by teachers and students in performing activities and the development of educational content. In all these strategies made explicit the role of language not only to represent and communicate meaning, but as a tool to negotiate, ask, answer and develop their own systems of shared meanings progressively richer and more complex. The importance of joint activity that students develop for the construction of new meanings extends to the whole process of learning where the educational value of the speech of the participants in the classroom is also evident in the process of evaluating the results of learning.

This confirms the hypothesis that when the student contributions are limited to short answers, communication in the classroom is not likely to lead to the active complex communicative development and participation. Conversely, student participation will be limited to simple tasks, such as memory, listing and labeling. But here we find that when students work including comments are open, making significant contributions to interactions by extending the discursive interactions, becoming the most effective learning environments.

Table 1: Global Analysis (retrospective patterns obtained with delays 1 to 5)

Conduct Criteria	Delay 1	Delay 2	Delay 3	Delay 4	Delay 5
Pers	Pers [6,28] Propos [2,28]	Pers [2,24] Propos [6,26]	Pers [2,19] Propos [4.04]	Pers [3,29]	Pers [3,19] Propos[2,06] Argum [3,19] Conf [3,19]
Propos	Pers [4,40] propos [5,28] conf [3,72]	Pers [6,40]	Pers [3,02] Propos [2,53]	Pers [4,27] Conf [2,31]	Infor [2,39] Conf [2,07]
Argum	Pers [3,66]	Pers [3,43]	Propos [4,47]	Propos [5,14]	
Suges	Dire [3,12]		Propos [7,98]		
Recor	Recu [22,23]	Eval [2,65]	Conf [13,89]		
Recu	Eval [2,62]	Conf [12,08]			
Cond					
Conf	Pers [3,10]	Pers [2,90]			
Valor	*Forma* [-2,42]	*Forma* [-2,19]	Valor [2,13]	Conf [2,86] Conf [-1,98]	Conf [2,05]
Eval	Corre [2,22] Eval [3,15] Forma [-2,83]	*Forma* [-2,03]	Argum 2.90	Eval [2,59] Conf [2,88]	Valor [1,99]
Forma	Infor [2,03] *Eval* [-2,30]	Forma [3,47]			Forma [2,47] Dire [-1,97]
Infor	Forma [2,03]	Argum [2,43] *Dire* [-2,08]			
Aclara				Recu [3,45] Forma [2,44]	Recor [3,6]
Confi	Argum [2,84]	Corre [2,19]		Suges [4,20] Valor [2,06]	
Dire	Infor [2,23] Corre [2,77]	Dire [2,26]		Infor [-2,08]	Dire [2,59] Corre [2,16] Descript[2,16] Forma [-2,55]
Corre		Dire [3,07]	Corre [5,55]		Dire [3,23]
Descr		Aclara [2,33] Dire [2,16]			Aclara [2,62]

[in regular font: adjusted excitatory remainders]
[in italics font: adjusted inhibitory remainders]
From selecting adjusted excitatory remainders (z>1.96) and the inhibitory (z<-1.96) in delays R1 to R5.

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