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ESP READING IN THE CONTEXT OF LEARNING*
Inglês Instrumental para Leitura no Contexto da Aprendizagem

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Abstract
The pedagogical implications of facing the teaching of reading in ESP through the text-based, the data-based or the interactive approaches have already been the source of many discussions. Apparently the interactive approach, i.e. a combination of the first two, has been unquestionably adopted by ESP practitioners. The purpose of the present work is to analyse, within the framework of a current renewal of interest in foreign language reading, which mode of ESP reading is first selected by ESP students in technical and scientific academic settings from the stand of the learner-centred approach. This report contains the results of tests applied to students of computing and the subsequent analysis.

Key-words: *reading comprehension; previous knowledge; instrumental; meaning.*

Resumo
As implicações pedagógicas de se abordar o ensino da leitura em inglês instrumental através de enfoques baseados no texto, nos dados lingüísticos ou na interação vêm sendo tema de muitas discussões na área. Aparentemente, o enfoque interativo, isto é, uma combinação dos dois primeiros, tem sido adotado sem muitos questionamentos por parte dos professores de inglês instrumental. O propósito do presente trabalho é analisar, dentro do contexto de uma atual renovação de interesse pela leitura em língua estrangeira, qual modelo de leitura em ESP é selecionado em primeiro lugar por alunos no âmbito acadêmico científico e técnico, a partir da perspectiva do enfoque centrado no

aluno. Este relato contém resultados de testes administrados a estudantes de computação, seguidos de suas respectivas análises.

Palavras-chave: *compreensão de leitura; conhecimento prévio; instrumental; significado.*

1. Hypothesis

It is a common observation that ESP practitioners gear their students' first steps in the area of reading comprehension with the help of an interactive model. Nevertheless, some common and general observations regarding classroom applications show a strong tendency to face reading in accordance with a defined model, based on all available knowledge sources: from text to concepts; holistic and descendent, the text-based model, or conceptually-driven processing (Mikulecky, 1990: 62). This point of view is also a generalised observation sustained by ESP students in technical settings, who cope with specific texts applying their previous ideas of content, genre and the world. This idea has been subjected to proof as it is expressed in point (c) of the implications included in section 5: Conclusions and Recommendations.

Such position led the research group to the following supporting hypothesis: ESP students reading texts in familiar content areas, i.e. connected to their field of study, perform a better comprehension task if they resort to their background knowledge (Woods, 1996: 59). It is the presence of background knowledge and their previous ideas that would have compensatory effect for the absence of linguistic proficiency.

2. Theoretical background

Practitioners at the School of Technology and Applied Sciences at the National University of Catamarca, Argentina, carry on their activities related to reading comprehension as the fundamental goal in their courses. Procedures leading to reading comprehension have to be

fulfilled gradually with the aim of obtaining a thorough knowledge of the scientific or technical texts.

It has been repeatedly demonstrated that science and technology students in academic settings read for information, not for pleasure. Hence they are required to approach technical and scientific texts instrumentally, with a view to comprehension. The view of reading dealt with in this research is essentially concerned with meaning; any interpretation of the word *reading* in which meaning is not central is excluded (Nuttall, 1996: 3).

Though reading and reading comprehension are complementary and interrelated processes, it seems that the latter is of a more complex nature. It involves the use of diverse strategies to build a pattern with the meaning assumed to be intended by the writer; the text in turn is consciously or unconsciously interpreted. This process also involves mental tasks that underline the human cognitive acts (Brown, 1994: 227-230). Reading comprehension is a link between previous and present knowledge that may only be altered by the reader in trying to construct the full meaning of a text.

Comprehending and comprehension can be viewed as a twofold phenomenon involving both process and product which derive from the interaction between thought and language in the act of reading. In addition, comprehension is a memory process based on knowledge; it associates what is known with the new information provided by the text in terms of the students' needs and purposes. It is thus seen that for the purpose of second language comprehension, meaning is not entirely based on the language code. Besides, learning and comprehension cannot be separated; comprehension is essential for learning and, in turn, learning is the basis for comprehension. In fact, these two processes go hand in hand.

A descriptive view of comprehension is obtained through the cognitive theory as well. According to this theory, comprehension is considered as a constructive process that begins with attention and encoding stages and passes through decoding to attain meaning. This meaning is supposed to be in the utterance or text, but new information, concepts or

ideas can have meaning only when they can be associated to something grasped beforehand. Therefore, every act of comprehension implies one's conception of the world that has to interact with some conceptual abilities and process strategies (O'Malley and Chamot, 1990: 55).

ESP teachers cannot disregard students' attitude towards the reading process as a decisive factor in the complex task of comprehension. Students' purposes are important in the determination of their degree of engagement with the text, and the most frequently identified purposes are either their personal interests, or the instrumental need for information. This is the case of students in science and technology.

Assuming that a student does have a real interest in a subject and that his knowledge of such a subject and of language is enough to make sense of a text, it is essential to realise what he actually does when he reads. Furthermore, all students need to be aware of the relevance and validity of their own schema to be connected to the particular rhetorical functions found in texts.

The following quotation serves as a reminder of the importance of schemata:

> *A useful way of thinking about this is provided by schema theory. A schema is a mental structure. It is abstract because it does not relate to any particular experience, although it derives from all the particular experiences we have had. It is a structure because it is organised; it includes the relationship between its component parts. There is much debate about the precise nature of schemata, but...[for] our purposes, it is enough to recognise the schema as a useful concept in understanding how we are able to interpret texts* (Nuttall, 1996: 7).

For most students, no text is primarily interesting as a piece of discourse in itself but as a bulk of useful information, though in some cases students lack confidence when reading authentic texts due to their difficulties with lexical meanings. Obviously, it is the teacher's task to build in their students enough confidence to help them in the reinforcement of reading, which may be developed through substantial and constant practice. Consequently, the ESP teacher's main task is to

activate the reading instruction programmes, so as to get students along in the precise path providing them well-timed and appropriate feedback.

For the purpose of this project it was assumed that these are prevalent methodological reading processings that have to be expounded, then observed, analysed, and afterwards tested.

In reference to reading as a data-based mode, or automatic processing of language features, the following brief description will be enough for the purposes of this paper: it consists of a series of discrete processing stages, each corresponding to a different level of linguistic analysis. It proceeds from the most primitive low-order level to the most complex high-order level. As a first step, letters are identified, then strings of letters are analysed into clusters with morphophonemic significance. Words are recognized and then, strings of words are parsed into phrase constituents. Word meanings are retrieved from the subjective lexicon and eventually a semantic interpretation of a sentence is produced (Anderson, 1977:5).

According to other writers, new information, new concepts and new ideas can have meaning only when they can be related to something the individual already knows. This methodology is called text-based mode. The reader brings to the task an amount of information and ideas, attitudes and beliefs. This knowledge coupled with the ability to make linguistic predictions determines the expectations the reader will develop as he reads. Skill in reading depends on an efficient interaction between linguistic knowledge and knowledge of the world (Brown & Yule, 1983: *passim;* Davies, 1995: 60-61; Wallace, 1992:42).

First, reading was considered as a passive task, next linguists held it was receptive. A third position was to regard it as an active process. Today, specialists account for it as interactive. Lower level students from ESP face reading tasks only after they become acquainted with all passage structures and vocabulary. At this level much effort is devoted to the teaching of vocabulary and grammar, but as soon as students improve their reading skills in English, they are introduced into new concepts which include class discussion and comprehension exercises of various types. Interactive reading requires both strategies operating

reciprocally to demonstrate that both of them are necessary to an adequate understanding of reading comprehension. Thus, the process of decoding is directed by the principle that input is organised against some permanent knowledge.

As it is also shown by researchers, the different stages of these models go along with processing at each level, and for example, word perception from one model interacts with processing semantic knowledge from another model.

Cook (1990:80) describes graphically the text-based and the data-based approaches of discourse processing. This description has been slightly adapted in the following way:

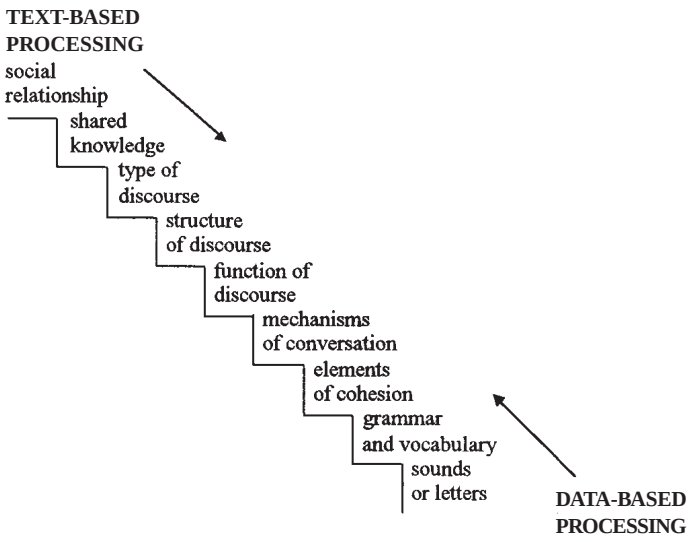

Figure 1. A schematic view of discourse processing

It is clearly established that interactive models imply that many processing skills are basic to reach efficient reading since they demand a constant interaction between text-based and data-based processing.

The point of departure of this work was the assumption that the interactive process constitutes the most widely accepted current view of reading. It is not demonstrated, however, that fluent and accurate reading can result from the constant interaction between these two processes. Anyway, ESP teachers make use of important aspects related to methodology and material, striking a balance between them. So, low-level data-based processing involving the physical text interacts with higher-level text-based processing demanding prior knowledge and text-type.

Nevertheless, the contention presented here is that the techniques the students resort to while decoding a reading input always rely on one model, either text-based or data-based processing, "either alternately or at the same time" (Aebersold and Field, 1997:18). Based on considerations about the text-based model as facilitator in the whole process of turning reading into a concrete step which is backed up by means of background activation, this processing is established as the predominant model in ESP reading. Besides, it is clearly determined that not in a few cases interactive processings fail because students receive interferences and process texts unidirectionally due to a natural over-reliance on one model of working. Here it is clear that text-based processes highlight text comprehension and meaning inferred and produced by technical students in actually creative acts.

At this particular stage, another important aspect in the act of comprehension can be recalled: the knowledge already stored in memory. This whole system of interrelated mental structures, the schemata, functions as part of the process of interpreting new information. According to sociolinguists, schemata constitute the components of each individual's competence, which in turn is efficient in handling particular types of problems. Certainly, this communicative competence is knowledge needed, it includes our own knowledge or ability to use linguistic forms appropriately (Hudson, 1980: 219-221).

At this point, it is necessary to stress that a reader brings to the text his knowledge about the world when he handles the cognitive and perceptual skills needed to reason and to form conceptual structures. At the same time prior strategies for reading may be modified by present reading tasks. The approach readers take depends on the actual context

or situation. Indeed, the role of comprehension in ESP is defined by language understanding which results from distinct cognitive subsystems working together. A coherent way of developing a comprehending process is enlightened by some substantial cues as the linguistic or instructive input, the receiver's information and contextual meaning. Input and knowledge are paired to integrate comprehension according to the reader's system though sometimes it is interpreted on the basis of experience. In both cases, the comprehension process is supported by contextual information (Wenden, 1991:105-107).

In this analysis some basic observations are essential not only to research but also to the theoretical model of the reading process. Reading has to be considered in its social context, taking into account what the readers are capable of doing and the influence of language in the reading process. This results in a personal attitude of ESP readers towards reading in a natural way. Let us quote de Beaugrande (1980: 30): ". . . how people know what is going on in a text, is a special case of how people know what is going on in the world at all". This can be equated with the concept that the knowledge possessed by people as readers of a language, concerning social interaction, constitutes one part of the general socio-cultural knowledge.

It is useful to point out that a consistent view of language is explained by sociolinguistics research findings. A widely held perspective is that there exists a close relation between linguistics and sociolinguistics in considering the structure of language, including the social contexts in which it is learnt and used. Insights of sociolinguistics are indispensable to the study of language or speech, because, as it is seen, both of them occur in human contexts. Social contexts encompass a large number of factors, including the social groups to which people belong, the structure or type of interaction and the shared participants' knowledge which will be both general (culture) and specific (present interaction). All these aspects of the social context interact when a person reads (Hudson, 1980: 231). Many of the properties of language are also properties of culture in general, and meaning is best studied in relation to culture and thought. Some sociologists take culture as socially acquired knowledge, or as the end product of learning. Culture is the

kind of knowledge we learn from other people, either by direct instruction, or by watching their behaviour. Also some problems of methodology that exist in the study of language are found in the study of culture (Hudson, 1980: 234).

It is important to take into account another aspect that comes up at the very moment of reading, that is, the inside of the human brain. Many parts of the brain remain active while reading because this process is not the exclusive job of any part in particular. Researchers also consider the mechanisms of memory, attention, anxiety, as well as the uses of language, comprehension, sociocultural differences and learning in general.

According to Mikulecky (1990:3-4), Goodman's (1970) work has exerted a strong influence on different views related to second language reading. In this model, the reader does not use all of the textual hints, but he has to make correct predictions of meaning, and most importantly, he has to confirm those predictions by relating them to past perceptions and to the reader's knowledge of discourse and language. The model then is connected with the current concepts of how thought and language interact. This has been tested against the linguistic reality or feedback produced by readers as they deal with printed texts which are observed for the first time.

Several researchers have proposed interactive models of reading instead of serial models. In this sense it may be useful to refer to the results stated by contemporary authors. All of them agree that reading is a process in which the readers anticipate, select, interpret and then understand or comprehend a text in terms of some questions previously posed. This process also matches information obtained from a text to internally activated understanding. Thus what we comprehend from a text partly depends on what we previously know. As it has been considered above, reading is the interaction between text and reader, so the reader himself must provide meaning by the use of different levels of internal information.

Understanding only bits of a certain text can make it possible to get the intended message; by means of the text-based approach we can

go imaginatively from one bit to another. If there is nothing to contradict our interpretation, we continue reading. Next, through the data-based mode, we can go back in order to read with more care only if there are inconsistencies. This is especially useful in the initial stages of learning to read (Nuttall, 1996:22); it implies an interactive processing of a text. Concluding, the teaching of reading needs to be linked to all the aspects related to the learning process.

3. Research procedures

The general ideas about reading described in this work were the source of exploration for this study. The research per se was undertaken with "the recognition that linguistic insights are not self-evident but a matter of interpretation; that ideas and findings . . . can only be *made* relevant in reference to other perceptions and perspectives that define the context of the problem" (Widdowson, 2000:5).

Jordan (1997:143) states that ESP students read for a *purpose*. Clearly, students can have different purposes in their reading; these will include:

- to obtain information (facts, data, etc.)
- to understand ideas or theories
- to discover author's viewpoints
- to seek evidence for their own point of view (and to quote), all of which may be needed for writing their essays, etc.

As stated above, the study was conducted at the School of Technology and Applied Sciences at the University of Catamarca. The texts for exploitation dealt with subject areas familiar to the students, who were learners of ESP as an ancillary language in the career of Computing. All of them were native speakers of Spanish and the object of the course was the acquisition of reading strategies so as to get information published in English. It is important to say that they were chosen at random to make up for possible influences on the results. It should be highlighted that the application of three different tests was not intended to test subject knowledge but text content knowledge acquired through reading comprehension.

The students had to take three tests in all, as follows:

Test No.1 approached reading as an interactive processing. Thirty-eight students completed it in almost two hours and fifteen minutes. The theme referred to different technological devices used in computing. This test included various types of activities focusing on the analysis of lexical and grammatical elements to reach the central idea and to understand grammar and texts. In this way it was possible to observe how the previous knowledge was activated by means of previewing and predicting. By means of inference students obtained meaning using contextual clues already known. The author's aim and his message were recognised through the text function. In this way students arrived at main and secondary ideas by means of structured diagrams. Ideas and details constituted a significant support in order to develop good comprehension.

Test No. 2 used a data-based mode; it was done in more than two hours and thirty minutes. The text referred to a widely known interface service. After having performed a number of activities related to the lexical and grammatical aspects, students achieved a clear idea of the interface service. The first tasks activated the students' previous knowledge getting the meaning through a detailed observation of a graph. They recognized the author's discourse and proceeded with the analysis of the different parts of the text by means of grammatical parsing and the identification of the functions of the words in the text. At the end they completed ideas and answered a questionnaire to train their verbal linguistic intelligence by applying cognitive strategies.

Test No. 3 represented reading through the text-based method. The text referred to a specific program, not very well-known by the students. It was taken by thirty five students in less than two hours; some students took only one hour and thirty minutes. They read the text successfully. After they activated their previous knowledge, they could use and practise strategies in an independent way integrating the new things they learned to the structures of their existing knowledge. They classified and grouped words with meaning taking into account the topic of the text, which made easier the finding of the central theme. After

they analysed a graph and the text making mental and image associations, they could relate the parts of the context as a whole and determine the message in order to cover all the aspects of meaning, grouping, evaluating and summing up what they acquired.

4. Analysis of results

The results of the tests provided rich data sources, and together they constituted the data corpus for the analysis of the study.

Reading in ESP can be made accountable for the purpose of research by the design of ad-hoc means of exploration. Due to the fact that it is concerned with the development of communicative tasks, it is possible to quantify the results of the tests in terms of number of students, number of activities and individual and total results in percentages. Based on the time employed and the results achieved by the students, the use of a text-based model appears to be more profitable. Of course it is implied that background knowledge, in a general sense, may have compensatory effects and vice-versa. The results of these tests are very interesting though not quite easy to interpret. They do, however, offer limited but important support for a broad approach to reading in ESP.

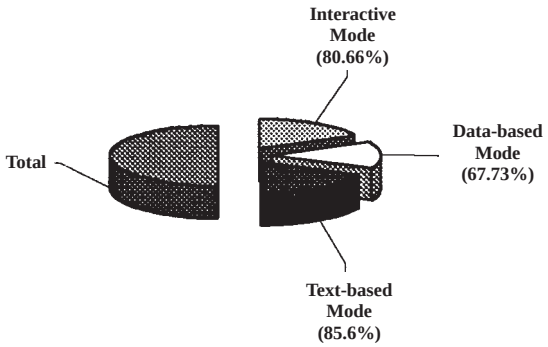

Figure 2. Graphic representation of the results

These results in numbers and percentages are shown in the following graphic representation. In Figure 2 the three processings are compared. The differences among them are clearly seen as well as the contrast between them and the results in percentages.

The text-based mode of reading rendered a significant 85.6% of students of Computing managing successfully the acquisition of information published in English. These students were far above those working with the interactive mode of reading, who achieved 80.66% in their task. Well below the preceding figures, the students who worked with the data-based mode of reading achieved 67.73% as a result of their task in about the same time as the other two mentioned above.

5. Conclusions and recommendations

This work hypothesised that ESP students reading texts in familiar content areas, that is, related to their own subject of study, would achieve a better comprehension resorting to their background knowledge. The presence of this background knowledge would have compensatory effect for the lack of linguistic proficiency.

The results obtained are considered to be particularly relevant. There are four major findings and some implications to bear in mind.

The findings are as follows:

a) Students are conscious of their reading purpose and they can determine an appropriate approach to each reading task.

b) ESP teachers depend largely on each student's natural ability to learn and as a consequence the working aim must be to facilitate such learning procedures.

c) Students facing a technical text with a varied set of activities always try to develop those that lead to a prompt result in a short period of time.

d) Through text-based processing ESP students develop a varied set of skills that an efficient reader generally possesses.

Among the most important implications for the teaching of reading in ESP it is possible to mention:

a) From the very outset ESP students in the area of Computing have to be encouraged to process holistically, rather than to decode in a step-by-step manner.

b) By comprehending the technical message through the text-based approach the students are made aware of the continuous interaction between text-derived meaning and their background-derived meaning.

c) Students operating through both data-based and text-based processes seem to depend on the type of text and on their background knowledge, language proficiency and strategies used. This point requires further research.

To conclude, a final recommendation may be suggested: out of the three modes used in the teaching of reading, the ESP practitioner should observe closely what his students initial attitude and proficiency are, and then gear them into a holistic mode of analysing a text. Finally, a replication of this study may render more specific results endorsing the present findings.

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