

ALEXIS: Computer-assisted Feedback on Written Assignments

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ABSTRACT

ALEXIS is an educational software package, designed to support teaching staff in a number of time-consuming tasks: organizing and managing courses, administering student activities and results, and, above all, supplying printed feedback on written assignments. ALEXIS has been used successfully in the curricula of Nijenrode, the Netherlands School of Business, and Twente University of Technology. In this paper we describe the specifications of the software package, and pay special attention to its capability of supplying differentiated commentary on the same textual shortcomings.

KEYWORDS

Evaluation of writing, computer-assisted feedback, composition instruction, teacher support software.

INTRODUCTION

'They write so badly; they are barely capable of putting their thoughts down on paper; even letters of application contain grammatical and spelling errors': these are some of the complaints one can frequently hear about the Dutch students' language skills. Writing instruction should be made much more effective, as is pointed out to Dutch writing teachers in Postsecondary Education by government and industry, but also by fellow teachers. This request is clear and justified enough, but how can a hardworking language teacher comply with it?

The classical approach of Dutch composition instruction is very simple: the teacher explains roughly what features characterize a good text, emphasizing the importance of correct formulation

and faultless spelling, and once or twice a year he¹ makes the students write a short essay. This essay is then assigned a mark and a simple commentary, and both teacher and student trust that the next essay will automatically be better than this one.

It becomes more and more evident, though, that this approach is not a satisfactory one. Writing is a complex process, and a teacher who wants his students to improve on this process cannot confine himself to product-oriented instructions and the didactics of the red pencil. Good writing instruction is process-oriented. Students should be given a realistic idea of the distinct phases that have to be passed through iteratively (see, among others, Frederiksen & Dominic, 1981; Flower, 1981), and they have to be instructed what to do exactly in order to arrive at an acceptable product, starting from a task specification.

Fortunately, in Dutch Postsecondary Education a similar form of writing instruction is becoming increasingly popular. Nowadays, in the majority of schools the handbook Leren Communiceren (= Learning to Communicate) (Steehouder et al., 1984) is being used, in which heuristics are presented to perform communicative tasks. Yet, process-oriented instructions are in itself not sufficient. Students can only learn how to write well if they are given the chance to exercise. In doing so they should also be informed precisely about the progress they are making. Just like in all other forms of proper skills education, effective writing instruction presupposes not only adequate process-oriented instruction and useful exercises, but also high-quality feedback.

WHY ALEXIS?

An important problem in modern writing instruction is the lack of time for teachers to supply high-quality feedback. However good their intentions are, they mostly confine themselves to some general comment, of which each student thinks it is meant in the first place for his neighbor. The numbers of students that have to be assisted are too large to provide everyone with the comment that would most adequately fit his writing achievements.

What about existing text-control programs such as EPISTLE (recently renamed as CRITIQUE) and WRITER'S WORKBENCH? Could they provide the solution to this problem? These programs generate 'automatic' information on text-characteristics such as mean word length and mean sentence length, percentage of passive sentences and number of nominalizations, and they point out mistakes to the writer such as in 'The Harrison contract was written by Bob Lee and I', and 'We will accept the funds, send receipts to the payers and crediting their accounts' (see, among others, MacDonald et al., 1982; Heidorn et al., 1982).

Yet, this is not the most effective approach to the feedback-problem; programs like EPISTLE and WRITER'S WORKBENCH

¹ Of course, 'he' implies 'she or he', 'him' implies 'her or him' and 'his' implies 'her or his'.

have a fundamental shortcoming: they do not understand the meaning of the text. Consequently, they are too unintelligent to take over the most important feedback tasks of the teacher. In the comment such as it can and should be given by the writing instructor, notions like document structure, selection and handling of information and tone play an important part. The text feedback as it can be independently generated by an up-to-date computer program, on the other hand, does not exceed the level of a very elementary and superficial style analysis. Expectations that in the next few years text-control programs for writing instruction will have much more to offer must be characterized as little realistic in view of the current state of the art in Artificial Intelligence research (see e.g. Wresch, 1984).

The fact that the writing instructor cannot fully depend on a computer program as far as his feedback activities are concerned does not imply that the computer cannot be of any help in commenting texts. On the contrary, but this is only true in case of a proper division of labor: the teacher takes care of the 'intelligent' tasks, the computer of the 'menial' ones. The teacher determines which student will be given which comment on which text. The computer's task is to print feedback texts and administrate the students' data. However obvious this division of tasks may seem, we know of only a few programs structured this way. In the last years, the following programs have appeared (primarily for the English-speaking world): RSVP, CAMELOT (see, among others, Anandam et al., 1980; Anandam, 1983; Camelot, 1982), WRITER, GRADER and READER (see Marling, 1983) and REPORT (see Marshall, 1985). In the same period, a feedback-supporting program package has been developed in the Netherlands as well, in joint participation between Nijenrode, the Netherlands School of Business and Twente University of Technology, by the name of ALEXIS (also spelled ALECSYS: an All-purpose Learner-oriented Efficiency-increasing Commentary SYSTEM).

ALEXIS: HOW IT WORKS

ALEXIS¹ helps the teacher to comment the products of his students. The system 'translates' simple codes introduced by the teacher into feedback texts which inform the student about what is wrong with his text, and/or what he should do to improve his next paper. ALEXIS consists of four sub-programs. With PROLEX (the PROduction program) feedback-texts can be created and, if desired, changed. DISLEX (the DIStribution program) takes care of the orderly appearance of the prints the students receive, and CURLEX (the course-member's program) administrates the

¹ The history of ALEXIS is as follows: in 1984 Looijmans and Schrauwen wrote the first draft of the package at Nijenrode; it was a Basic-Plus-program, implemented on a PDP 11/44 minicomputer. A larger team, among whom the authors of this paper, has since 1985 worked on the development of a greatly augmented and improved version, suitable for MS DOS microcomputers. It is this version, written in MS PASCAL, that is being discussed in this paper.

activities and achievements of the students. The central element in ALEXIS, though, is SELLEX, the feedback-SElection program.

SELLEX allows the teacher to assign commentary to each student, along with the numbers of the text lines to which the commentary relates. It is very important that the teacher, just like in an individual teacher-student discussion, can differentiate his feedback. Depending on a variety of factors (graveness of the error, frequency, feedback supplied earlier) the instructor should be able to choose from a great diversity of commentaries. SELLEX provides for this, as it allows for broad and in-depth feedback-differentiation.

Whenever the teacher finds a shortcoming in a student's text, he has the 'broad' choice out of (combinations of) five possible commentaries:

- 1 error name: short text (1 line maximum) serving as a label to the error, for example:
 - A.1.3.4. metaphor unintentionally comical
 - F.1.2. old-fashioned construction
 - O.1.4. description of action incomplete
 - U.3.1. literature reference in text incorrect
- 2 error description: longer text (5 to 10 lines), explaining in as much detail as possible what the student has done wrong and why it is worthwhile to avoid such an error, for example:
 - O.1.4. In this passage you describe an instruction for a series of actions. Your description is too concise: the reader is not clearly informed about what exactly he should do. If you want to make sure that your public, with the help of your text, is able to carry out the required action(s) faultlessly, you must give all the necessary information.
- 3 corrective advice: longer text (ca. 5 to 15 lines) indicating how the mistake may be corrected, for example:
 - O.1.4. Give more information about the series of actions described in this passage. A good starting-point is the standard action-structure: What is the purpose of the action? What conditions need to be satisfied? What is the broad outline of the proceeding? How are the sub-actions carried out? How is the proceeding checked?
- 4 study advice: reference to a passage from an instruction book in which the student may find more instructions on how to avoid the mistake in question in the future, for example:

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- O.1.4. In chapter 4 of Leren Communiceren six standard structures are discussed which can serve as starting-points in text-production. It would be a good idea if you would read again section 4.1.4., which deals in more detail with the standard action-structure.
- 5 exercise advice: reference to further exercise (sometimes in the form of a CAI-program) in which attention is paid to just the type of error in question, for example:
- O.1.4. In section 7.6 of Leren Communiceren you will find three exercises in constructing a planning on the basis of a standard structure. Find out how these exercises will improve your skills in handling standard structures.

The instructor is enabled by SELLEX to make 'in-depth' differentiations as well. The feedback he gives may have different levels of specificity. When the instructor finds the student tries to deal with two questions within a single paragraph, he can give a highly specific commentary at the level S.2.3.1. ('arrangement error: more than one question to the paragraph'). He may also select the somewhat less specific feedback-level S.2.3. ('arrangement error: inadequate paragraph arrangement'). Even less specific is feedback-level S.2. ('arrangement error'); the least specific commentary is generated when the instructor merely selects S. ('Structure is faulty').

Some simple calculating tells us that the broad and the in-depth differentiations in SELLEX enable the teacher to react in dozens of different ways to the same error. But which way is the best? An error description at the most specific level, an error description and a corrective advice at a somewhat less specific level, or merely a rough study advice? To answer these questions, no unambiguous, detailed prescriptions can be given, no more than in the case of the 'classical' individual teacher-student discussion. It is clear, though, that the feedback decisions of the teacher are better accounted for as his insight into the structure of his feedback-file and the educational history of his students increases.

The commentary texts in ALEXIS have been hierarchically arranged in order to give the teacher the greatest possible insight into the feedback-file. The arrangement of the subject matter in Leren Communiceren has served as starting-point, and whenever practice required so, the file has been supplemented with error categories that did not figure in Leren Communiceren, but that did turn up in the students' products.

At the moment, ALEXIS contains a total of ca. 1100 commentary texts. To enable efficient searching in this large data base, several search and selection facilities are provided. The teacher can type the index number of a text, or he may ask for a part of the list of error names, from which he can make a choice. Another possibility is to type a substring of the error name the user is looking for. If more error names than one match

such a substring, they are all displayed on the screen, and the user can select the right one.

In order to inform the teacher adequately about the educational history of each of his students, ALEXIS contains a feature enabling the teacher to request this history in any stage of text-commenting. ALEXIS then supplies a survey of the errors the student in question made in earlier assignments, along with the relevant commentary he received at those occasions.

ALEXIS: THE RESPONSE SO FAR

After positive results in writing instruction had been obtained at Nijenrode with a predecessor in the academic year 1984-1985, the version of ALEXIS as described above has been applied for the first time at both Nijenrode and Twente University in the second term of the academic year 1985-1986. Again, both staff and students reacted in a positive way. The students mentioned as strong points the selectivity and the informative value of the feedback, whereas the staff turned out to appreciate the promptness of the system and the ample differentiation possibilities. There has not yet been a detailed study of the effects of the ALEXIS-feedback on the learning achievements of the students, but it is beyond doubt that both parties have a high opinion of its learning efficacy.

This does by no means imply that ALEXIS is not susceptible of improvement. In the first place, the wording of the feedback-texts deserves more attention. An error description which appeared utterly unambiguous during the development of ALEXIS sometimes turns out to be misunderstood by a number of students, and what seemed to be an obvious corrective advice in the preparation stage, has sometimes turned out to be hard to execute in practice. Also, the need has turned up of a (modest) facility to supply some extra feedback that is not (and does not need to be) integrated in the system, to individual students in incidental cases.

Furthermore, a manual is needed to assist the instructors in determining the quantity and class of commentary they wish to supply. Anandam et al. (1979) suggest no more than five commentaries at a time, so as not to overwhelm the student. This seem a sound advice; we would like to add that in feedback-supply, the final object of the course should be kept in mind. The ideal student learns to make out for himself what the strong and the weak points of his text are, and what he should do to improve it. The ideal instructor makes himself redundant as the course proceeds. We have already asserted that detailed prescriptions for feedback-supply are hard to give. Generally speaking, though, instructors can be advised to make the feedback 'broader' and 'deeper' in the beginning of the course than at the end. However, more research is needed - and will be conducted - to develop useful guidelines to help teachers in supplying feedback.

In the fall of 1986 a new version of ALEXIS, improved as described above, will be installed in a number of institutions for

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Postsecondary Education in the Netherlands that are prepared to experiment with ALEXIS. In these institutions, evaluating and effect-measuring research will be carried out. After the results of this research have been analyzed and the software, where necessary, has been adapted, a commercial edition of ALEXIS can be released¹.

A final remark: this paper may have brought about the impression that ALEXIS is merely suitable as a feedback program for postsecondary Dutch-language writing instruction. If so, this impression is not correct; ALEXIS may be applied in any curriculum in which the teacher wishes to comment on the achievements of his students. PROLEX allows any conceivable modification of and supplement to the feedback-files, providing the instructor submits his curriculum to a profound analysis. He should explicate what the precise learning goals are, what he regards as shortcomings in the achievements of his students, what relevant corrective and study advices are, et cetera. Good teachers will consider this an advantage rather than a drawback: the quality of their teaching will certainly be enhanced by such a systematic analysis of the curriculum.

¹ More information about ALEXIS can be obtained from:
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