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Production and Evaluation of a Computer-Assisted Second Language Reading Programme

Jacqueline Werner

A Thesis Equivalent

in

The Department

of

Education

Presented in Partial Fulfillment of the Requirements
for the Degree of Master of Arts in
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ABSTRACT

Production and Evaluation of a Computer-Assisted Second Language Reading Programme

Jacqueline Werner

The purpose of this thesis-equivalent is to describe the production of computer-based materials for a second language reading programme for adults and to evaluate their instructional and technical design.

The evaluation was conducted in three phases. The first phase occurred while the product was still in its conceptual stage; the second phase began once the first draft of the materials had been developed on the computer; the third phase evaluation began once problems had been corrected and the software was running reliably.

Data from the first two evaluations were collected through oral and written comments and informal interviews. During Phase 3 of the evaluation, three types of data instruments were used: 1) observation 2) interview 3) questionnaire. The instructional and technical designs were favourably evaluated. Nevertheless, results from this study indicate the value of using a dynamic, interactive prototype during the design stage to more fully understand the design issues.

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TABLE OF CONTENTS

CHAPTER 1	THE PROBLEM	PAGE
1.1	Problem Statement	1
CHAPTER 2	REVIEW OF THE LITERATURE	
2.1	Introduction	5
2.2	Psycholinguistic Theories of Reading Comprehension	6
2.3	First Language reading (L1) vs Second Language Reading (L2)	9
2.4	L2 Reading Strategies	11
2.5	Studies in CAI Reading Instruction	14
2.6	Limitations of Reading Instruction on the Computer	19
2.7	Advantages of CALL	20
CHAPTER 3	PRODUCTION AND DEVELOPMENT	
3.1	Introduction	25
3.2	Production	29
3.3	Sample	29
3.4	Pedagogical Goal	30
3.5	Task Analysis	31
3.6	Objectives	32
3.7	The Medium	33
3.8	Design Documents	34
3.9	Materials Development	36

CHAPTER 4 FORMATIVE EVALUATION PAGE

4.1 ELMO Formative Evaluation Plan 40

CHAPTER 5 METHODOLOGY

5.1 Introduction 46

5.2 Procedure 46

CHAPTER 6 RESULTS AND DISCUSSION

6.1 Introduction 54

6.2 Results and Discussion - Phase 1 and Phase 2 54

6.3 Results and Discussion - Phase 3 58

CHAPTER 7 CONCLUSIONS

7.1 Introduction 90

7.2 Outcomes of the Phase 3 Formative Evaluation 90

7.3 Suggestions for Improving the Formative Evaluation Process 94

BIBLIOGRAPHY & REFERENCES 98

APPENDICES

APPENDIX A Activity Descriptions & Sample Screens 103

APPENDIX B Pretest 124

LIST OF FIGURES

FIGURE		PAGE
1	ELMO Screen Components	28
2	Contrast between Phase 2 and Phase 3 of A Formative Evaluation	44
3	ELMO formative evaluation phases	48
4	Lecture Active Exercise from Compréhension de L'Écrit Option: Auxiliary Screen	107
5	Lecture Active Exercise from Compréhension de L'Écrit Option: Primary Screen	108
6	Example of Commentaire explanation shown on auxiliary screen	109
7	Example of Expressions explanation shown on auxiliary screen	110
8	Example from the on-line Dictionnaire definition screen	111
9	Example from the Réference Grammaire explanation screen	112
10	Idée Principale Exercise from Compréhension de L'Écrit Option: Primary screen	114
11	Idée Principale Exercise from Compréhension de L'Écrit Option: Auxiliary Screen.....	115
12	Lacunaire Activity from Compréhension de L'Écrit Option: Primary Screen.....	117
13	Reconstruction Exercise from Compréhension de L'Écrit Option: Primary Screen	119
14	Reconstruction Exercise from Compréhension de L'Écrit Option: Auxiliary Screen	120
15	Comp du Texte Exercise from Compréhension de L'Écrit Option: Primary Screen	122
16	Comp du Texte Exercise from Compréhension de L'Écrit Option: Auxiliary Screen	123

LIST OF TABLES

TABLE		PAGE
1	Notes on observation of candidates during ELMO sessions	59
2	ELMO system questionnaire and responses.	61
3	Interview questions and answers	71

Chapter 1

THE PROBLEM

1.1 PROBLEM STATEMENT

The role of the computer in second language learning has until recently, been so narrowly focused that its impact has been very limited. During the 1960's and early 1970's most applications had been geared towards very traditional types of Computer Assisted Instructional (CAI) activities such as drill and practice or tutorial approaches. Projects addressing the skill area of reading typically dealt with one particular language feature such as vocabulary and tended to focus on a word or sentence in an isolated context. Computer Assisted Language Learning (CALL) activities tended to follow a traditional second language teaching approach which deals with language as a formal system of rules and discrete categories in a stimulus-response, habit-forming pattern.

Toward the end of the 1970's, theories and ideas about second language learning shifted emphasis away from learning a language in the context of isolated words or sentences to a more language rich environment in which language activities would be concerned with authentic language from which meaning would be derived. A strong current of interest developed in new ways to exploit the computer to accommodate these new theories and to change

the role of the computer and its relationship to the learner (Higgins, 1983).

Within the reading area, projects which explored reading strategies and reading as a problem-solving process began to emerge (Wyatt, 1983). An example of this development is the "Puzzler" project developed at Queen's University (Wheeler, 1983). Students are presented with pages of stories involving riddles and puzzles and at key points in each story, the learner is asked to make predictions, modify them, and add new ones.

Although these projects are more sophisticated than the earlier CALL materials, they tend to focus on reading as a single behaviour or ability. Phillips (1984) regards reading to be a process involving a series of behaviors or activities and outlined a five stage process based on psycholinguistic research for the development of reading strategies. The five stages include the following: preparation or preactivity, skimming and scanning, decoding, comprehension, integration.

As a result of difficulties in meeting language training goals, particularly for Anglophones studying French, DND launched a major internal study. Informal research conducted at one of the military language schools investigated the use of CALL as a potential solution to many of the underlying problems identified in the ensuing report. Project ELMO (Enseignement des

Langues par Micro Ordinateur) was the result.

Hoss Defence Systems Ltd. was given the mandate to develop the ELMO training system, the computer materials, and to conduct a preliminary formative evaluation of the product. The contract stipulated the instructional approach to be used, the review stages, and the people that would be involved in the evaluation.

For the purposes of this study, a number of computer materials were created based on the 5 stages of reading development recommended by Phillips. These materials were also designed to take full advantage of the opportunities offered by the computer medium which are not possible in a pen-and-paper environment. This study investigates what contributes or detracts from their effectiveness in terms of both the instructional and technical design.

Ideally, the product should be tested on the target population to assess its pedagogical content. However, project time constraints prevented the author from testing the product on the target population. Since data is most valid and reliable from the intended users, this thesis equivalent will not address the pedagogical content but will consider only the instructional and technical design aspects of the program.

The aim of the formative evaluation plan is to

determine to what extent the following criteria have been met:

1. The program has a sound instructional design influenced by theoretical and practical knowledge of how people learn.

2. The instruction is suited to a computer presentation. The computer presents the learning materials more effectively than any other means of instruction.

3. The software is technically reliable under normal conditions of use.

4. The software is easy to use for individuals with a minimum of computer expertise.

Recommendations as to the necessary modifications to achieve these goals and thereby enhance the product will be made.

Chapter 2

REVIEW OF THE LITERATURE

2.1 INTRODUCTION

In most adult ESL classes, reading and writing play a secondary role to listening and speaking The lingering effects of the audiolingual tradition dictate the prescription "hearing before speaking, speaking before reading and reading before writing." As a result, reading has been one of the most neglected areas of the ESL classroom. Reading skills are considered to be a by-product of being able to speak in the target language. However, experience has shown that simply learning listening and speaking does not lead to the ability to understand written text.

Reading is the primary source of the acquisition of the lexicon and grammar of the target language. Th' more current language learning theories support the view that reading is a primary agent in providing input for general second language proficiency. Krashen (1983) argues that man acquires language in only one way, "... by understanding messages, or by receiving comprehensible input". Reading, while not sufficient for the development of oral skills, can be looked on as comprehensible input and greatly contribute to language acquisition.

2.2 PSYCHOLINGUISTIC THEORIES OF READING COMPREHENSION

Goodman (1968) has defined reading as a selective process in which the reader, guided by his knowledge of the language, relates graphic cues to syntactic, semantic, and phonological cues, decodes these choices, stores them, and then subsequently tests and associates them with future decoded choices. A proficient reader seeks to decode the words in print by drawing on previous experiences and concepts as well as the language competence s/he has achieved.

Comprehension is the ultimate goal of reading instruction and plays a central force in the reading process. However, comprehension refers to a global grasp of the text - not simply deciphering each word within a text passage. This is established by being able to perceive and interpret the message of the communication through key-words, discourse references (e.g. the foregoing, as follows, etc.), linguistic cues such as syntactic devices (e.g. past tense "ed" marker), and non-linguistic cues such as punctuation.

Phillips (1984) has identified three interrelated factors responsible for successful comprehension:

1. one's current state of linguistic knowledge or competence;
2. an individual's cognitive skills, and;
3. one's general experience and knowledge of the world.

Linguistic knowledge refers to the awareness and understanding of the lexical, syntactic, and semantic elements of a language. Without this understanding, the learner is unable to draw on the information implicit in the grammatical structures of the language or select cues to meaning necessary for the decoding process.

Cognitive ability enables the learner to develop reading strategies in order to decode the language. Typical strategies pertinent to the reading process go from simply deciphering written symbols to combining words and meaning to higher level understanding of the lexical and contextual meanings. Tetrault (1984) refers to the more concrete skills of reading as word processing abilities and the more abstract skills as text processing abilities.

Word processing activities include going from print to sound, making predictions about words to come based on preceding text, and encoding the printed stimulus into memory. Text processing skills include relating prior knowledge to the information in the text, understanding implicitly logical relationships between sentences in the text and being able to integrate all the information in a text systematically. A learner acquires the skills of reading by gradually reducing the processing of the concrete skills and increasing the more abstract ones.

A student's general knowledge and experience of the world is also an extremely important variable in second language reading. For example, one's ability to speak a European language will transfer some knowledge to the learner of English in a way that proficiency in an Asian language will not. Input dealing with areas the student is familiar with has a better chance of being understood and will thus be of greater value for language acquisition. Krashen (1984) points out that acquisition will also be enhanced when input deals with topics of interest and relevance to the student. The affective filter is lowered and more input will reach the language acquisition device.

Current research has shown a strong link between prior knowledge and cognitive processing in reading comprehension (Blohm, 1982). A top-down process occurs when readers comprehend by bringing more information (prior knowledge) than the text brings to the reader. The bottom-up process occurs with the gathering of low-level information (letter features, letters) and higher-level encodings (word groups, and word meanings). When these two processes converge, the reader is able to determine the author's overall intended meaning and comprehension occurs.

In summary, the research literature suggests that reading comprehension is a function of many factors

including reader characteristics such as linguistic competence, prior experience and expectations of the text content, and learning strategies.

2.3 FIRST LANGUAGE READING (L1) VS SECOND LANGUAGE READING (L2)

Good native language reading strategies, while helpful, do not transfer automatically or guarantee success in second language reading. Schultz (1983) found that the difference in reading ability between reading in the first and second language decreased considerably when dealing with a second language text. This can be attributed to the fact that second language learning strategies and decoding efforts take place at a more conscious level. Factors, all related to the dimension of linguistic competence put the L2 reader at a disadvantage.

McDonell (1973) describes reading as a sampling process whereby the reader predicts structures, tests them against the semantic context built-up from the ongoing discourse, and then confirms hypotheses as the processing of further language occurs. The successful reader will sample and select enough information from the printed word to make a prediction about the structure and the meaning. The guessing or predicting ability is hindered by the L2 reader's imperfect knowledge of the language.

In addition, the L2 reader has difficulty in making the necessary associations between the different cues selected. The simultaneous acts of predicting future cues and making associations with past cues often results in forgetting what went on before as the reader tries to process the subsequent sentence. Yorio (1971) attributes this difficulty to the need to concentrate on a triple process: storage of past cues, prediction of future cues, and associations between the two. This process represents a cognitive overload for the reader who is unfamiliar with the linguistic code.

To reduce this overload, readers require redundancy or the availability of information from more than one source. Reading is a hypothesis-testing process in which readers select cues to meaning and make contextual guesses and predictions about the discourse. The provision of supplementary cues drawn from sources outside the text should help readers in the comprehension process. Research has shown that extralinguisic information can substantially increase the comprehensibility of input (Krashen, 1984).

For example, the use of pictures can provide a conceptual framework for organizing the input and reducing uncertainty. Pictures give the reader certain indications about the relationship of events occurring in the passage enabling the reader to make better

predictions about what will occur and eliminate certain hypotheses that would mislead the reader in the comprehension of the text. Studies by Ommaggio (1979) in reading comprehension have shown that visual organizers can help readers to comprehend passages.

Consequently, to make L2 readers more proficient, instructional material must be designed which allow them to do the following:

1. gain control over language structures;
2. develop strategies for anticipating meanings, syntactic patterns, and graphic features of discourse;
3. link ideas and remember important details.

2.4 L2 READING STRATEGIES

Phillips (1984) has outlined a five-stage process for developing reading strategies based on psycholinguistic research in second language reading. The five stages are identified as:

- o Preteaching/Preparation Stage
- o Skimming and Scanning Stage
- o Decoding/Intensive Reading Stage
- o Comprehension Check
- o Transferable/Integrating Skills

I. Preteaching/Preparation

This is the stage in which learners draw on their knowledge of the word or their own experience on a given topic and build expectancies for the material about to be read. One commonly used approach is the development of a

set of preposed questions. The questions help to orient students to the relevant sections of the discourse, help him/her to organize the input, and build expectancies for the type of information to be encountered.

II. Skimming/Scanning

Skimming is a process in which students read for the general gist of the message and scanning is a process in which readers attempt to locate specific information from the text. Skimming can be practiced separately or along with scanning.

Skimming is used to help the reader achieve a general understanding of the lexical and structural information in the text and to establish anticipation skills so that the more detailed reading in the later stages is conducted in the proper framework. Skimming may be subsumed in the prereading stage particularly if the students have already seen the text.

Scanning goes a step beyond skimming requiring the reader to locate more specific detail that demands additional amounts of information. Scanning exercises should provide tasks covering language, content, and inference.

Examples of activities that can be performed during the skimming/scanning stage include: identifying topic sentences or main ideas, selecting the best paraphrase of

the main idea or conclusion, and matching subtitles with paragraphs.

III. Decoding/Intensive Reading

At this stage, readers are assigned tasks which require decoding the essential elements of the passage. Decoding may take place at the word, phrase, or discourse level to help students expand vocabulary, see how the cohesive elements of the discourse operate, or learn to make generalizations based on the writing.

Examples of activities at this stage include completing a text in which lexical items have been deleted and reordering text. The first task demands knowledge of the cohesive elements of discourse at a micro level (word level) and the second task involves an awareness of the cohesion and coherence elements at a macro level (between sentences and paragraphs).

IV. Comprehension

The comprehension stage is the culmination of all the preceding stages. Questions should deal with assessing a global understanding of the reading passage and question types can include questions about key ideas and supporting details, inferences, seeing cause and effect, and drawing conclusions. Evaluation with respect to the linguistic elements can include questions dealing

with lexical information, grammatical elements, and the coherent and cohesive elements of the text.

V. Transferable/Integrating Skills

The final stage involves the development of cognitive strategies that go beyond the particular features of a given passage and whose sole intent is enhancing reading skills per se. Phillips (1984) identifies several practices such as recognizing the grammatical functions of words and using the information to guess at meaning, identifying unessential words, and combining unconnected words and phrases into meaning. Although this stage is included as a separate stage most of the behaviours mentioned correspond to the previous stages outlined above.

2.5 STUDIES IN CAI READING INSTRUCTION

Most of the research conducted on the impact of computer-assisted instruction in reading has focused on first language reading at an elementary school level. Results of studies on the effect of CAI on reading achievement for this level are inconclusive. Chambers & Sprecher (1980) found more significant gains in standardized reading test scores for CAI students than for non-CAI students. Converseley, Chamberlain and Beck &

Johnson (1983) report the absence of significant differences between CAI and non-CAI groups.

Studies on the effects of CAI on reading achievement on high school and adult learners report mixed results. Findings by Carver and Hoffman (1981) indicate that the effect of reading practice using a Plato IV terminal was more effective at beginning levels and less effective at advanced levels. However, a study by Caldwell (1979) showed that a multi-sensory instructional approach that included CAI, printed materials, and videotapes improved students' reading grade level. Similar results were found by Geller & Shugoll (1985) in an experiment to assess the impact of introducing CAI into an individualized educational program. In the experiment, the CAI component supplementing paper and pencil materials produced greater gains than paper and pencil materials alone.

Hirschbuhl, Myers and Hirschbuhl (1980) examined the impact of CAI on seventh and eighth grade students in a remedial reading program over a period of several years. The results of the experiment concluded that the remedial CAI group always scored a growth rate of at least 0.5 months greater than the control group.

In second language learning, even fewer reports on the effect of CALL on ESL reading achievement have been published and the research that does exist is often incomplete or flawed.

The most widely known and extensive projects have been developed on the Plato network. Plato's distinguishing mark has been the sophistication of its terminals, which use high resolution graphics and a touch-sensitive screen and its ability to keep records and monitor a student's progress. In spite of Plato's capabilities for collecting, storing, and manipulating data very few reports have been published on the evaluation of these learning projects.

Saracho (1982), in comparing the achievement of two groups of Spanish migrant children grades, found that those receiving both conventional instruction and CALL achieved greater gains than the group receiving conventional instruction only.

In contrast, in their report on a CAI program for third through sixth grade Lakota Indian children, Edeburn and Jocabi (1984) report that their major objective was not reached; namely that seventy-five percent of students would gain a minimum of three normal curve equivalents as measured by pretest and posttest comparisons on the "Comprehensive Test of Basic Skills." However, in their report, they do not describe the materials or the manner in which they are used.

Curtin and Shinall (1984) findings support this study. They did not find substantial gains for students using computerized instruction. In comparing students

working in a conventional classroom on a Russian translation course and a similar group of the same size taking the course through Plato, they found that although there was no significant difference in the spread of grades between the two groups, the amount of time spent on the instruction for the Plato section students was significantly less than the average classroom time. This suggests that students who used the computer studied more efficiently than those in the conventional setting. It was also reported that students using the computer were less anxious, had greater motivation, and a greater feeling of success.

Although there appears to be contradictory data on the impact of CALL, one area of agreement seems to be the positive attitude of students using computerized instruction. Olsen (1980), in a survey of foreign language departments in the U.S., reports that almost all the departments using computer programs reported some positive results; most conspicuously, an improved attitude of the students particularly because of immediate and individualized attention their work receives.

Clarke (1986) suggests that one of the limitations of current courseware in the language learning field is that the materials consist of single-skill exercises focusing on one particular language area. Instructional

computer programs in reading have generally been concerned with language features, general discourse features and to a lesser extent reading strategies. Programs focusing on vocabulary exercises, discourse awareness, or other language areas he terms discrete item exercises. These programs, while offering a light relief from a book-based programme, do not integrate reading skills nor do they activate the reader's background knowledge.

He has reported on a project called Texteplore which consists of varied computer-based activities, centering around a chosen text with the emphasis on developing reading skills. According to Clarke (1986), the aim of the Texteplore program is to create a rich learning environment where users will have access to the means of understanding and improving a variety of reading skills. The Texteplore program consists of a series of activities based on the following well-established areas: Prediction, Skimming, Scanning, Inference of word meaning, Grammar, Deictic features (cohesion at the micro level), and Discourse Awareness (coherence and cohesion at the macro level). These areas are similar to the stages of reading development outlined by Phillips (1984). At present, no data have been reported on this system although it is currently being tested.

To sum up, studies on the impact of CAI in reading have reported conflicting results for native speakers and second language readers at all levels. However, one area of agreement appears to be the positive attitude of students receiving CALL instruction in reading.

One area of criticism with respect to CALL is the disparity between current reading theory and the pedagogical design of courseware. Most of the courseware that has presently been developed focuses on discrete skills rather than taking a holistic approach to reading instruction. As such, there has been little or no emphasis on activating the reader's background knowledge or encouraging the reader to make meaning out of text.

2.6 LIMITATIONS OF READING INSTRUCTION ON THE COMPUTER

In spite of the computer's ability to dynamically display text, there are several shortcomings in using this medium for presenting reading materials. The major practical consideration is the limited amount of text displayable on the video screen at any one time. Typically, computers will display only 24 lines of 40-80 characters, as compared to a typical typed page of 56 lines with 70 characters per line. When text manipulation is required, the computer presentation is often awkward to use.

A second limitation, as with many other types of CALL, is the computers' inability to handle relatively open-ended or higher-level interaction with students. With the current emphasis on the communicative nature of language, the inability of computers to deal with natural language is severely limiting.

A third limitation of using the computer for reading materials is the problem of eyestrain. Limiting the learning environment to interaction with the computer screen, may place the learner suffering from eyestrain at a disadvantage.

2.7 ADVANTAGES OF CALL

CAI has also been cited as having many advantages in assisting the learning process including: self-paced and highly individualized instruction; consistent instructional quality; fast learning time; increased motivation; immediate feedback; and the ability to monitor student progress. All the advantages the computer has offered in the other disciplines also applies to CALL.

Wyatt (1983) notes that both reading and listening skills are by their very nature highly individualized and idiosyncratic. He suggests that CALL can offer a more individualized student-centered approach than is now

available in traditional classes where there are varying levels of reading speeds and comprehension.

In addition to the individualized nature of CALL, the computer also offers the following advantages in the presentation of text (Wyatt, 1983):

1. The dynamic potential of the video screen to innovatively present text;
2. The immediate access to on-line reading tools such as a dictionary, thesaurus, index or glossary without intruding on the reading task, and;
3. The ability to manipulate text.

Most studies report fatigue, eyestrain, and slower reading of text when reading from a computer screen (Barbe & Malone, 1984; Hansen, Doring, & Whitlock, 1978; Hansen & Haas, 1988). However, a study conducted by Muter, Latremouille, & Treurnier (1982) found that although reading was slower from a video screen than from paper, almost equal comprehension scores were produced. In addition, Hansen et. al. found that the negative effects of reading from a computer screen could be reduced through the manipulation of various factors including page size, legibility, responsiveness, and tangibility which affect performance.

A study by Kleinmann (1987) to determine the effectiveness of computer-based ESL reading materials found no significant difference between groups exposed to the computer-based reading materials and others that used

print-based materials. Kleinmann compared three groups of students in a treatment group that received CALL materials with three control groups that only received print materials. No significant difference was found between the treatment groups and the control groups. However, it should be noted that the CALL material was a drill and practice activity not appropriate for advanced students who need to develop higher level reading comprehension skills. Also, the treatment group was given only 6 hours of CALL during a semester. As Kleinmann points out, future CALL researchers should make every effort to use appropriate materials which interface well with the objectives of the study skill. In addition, the researchers should increase the exposure to CALL over several semesters.

Fish & Feldmann (1987) investigating the differences in reading informational and directional materials from print and computer-mediated text found the computer to be a viable alternative for reading activities.

Not only is the computer a feasible alternative to print-based materials, it also has the capability of displaying text in ways that are impractical with print media.

The capability of computers to manipulate text is concurrent with present theories of reading which emphasize that comprehension is an active cognitive

process requiring the reader to interact with text-based information. The technological attributes of the computer permit an interactive flow of information between the text and the reader which is not offered by conventional print-based materials. This application, known as hypertext, links key expressions in a text to reference information. The phrases or words are flagged indicating to readers that additional information is available. The user accesses the information by selecting the flagged expressions.

In a study by Reinking & Schreiner (1985), the computer was used to mediate text in an individualized fashion and to monitor and assist an individual reader experiencing comprehension difficulty. Subjects could request or were given the following supports: (a) definitions of key vocabulary items; (b) a simpler less technical version of the text; (c) supplemental background information; and (d) the main idea for each paragraph. Results indicated that computer-mediated text, which allows the reader to interact with the text in a search for meaning, has a positive affect on reading comprehension. It is interesting to note that comprehension was most consistently increased when text manipulations were under computer control.

An area of serious criticism often cited with respect to the use of CALL programs in reading is that

they deal with the morphology of the word, phrase or sentence level syntax often devoid of context and provide very little language environment for acquisition.

In summary, the advantages that the computer offers in other disciplines also apply to using CALL to teach reading. Although most studies favour reading from print-based materials, the negative effects of reading from a computer screen can be offset by optimizing ergonomic conditions which affect performance.

One area that holds the greatest promise for computer-mediated text is through a concept known as hypertext which allows the reader to interact with the text in a search for meaning.

Chapter 3

PRODUCTION AND DEVELOPMENT

3.1 INTRODUCTION

When completed, the ELMO system will consist of several modules each geared towards specific grammar points and language functions. Each module is be designed around the four skill areas: (Reading, Writing, Listening, and Speaking). Several activities are available to promote learning within the specific skill area. Depending on the skill area, either audio or video channels are integrated with the computer.

The reading component represents one of the four skill areas that constitute this multi-media language learning program. To help the reader gain a better understanding of the project used for this thesis equivalent, it would be useful at this point to describe the characteristics which are generic to the entire ELMO system.

The ELMO system is currently geared towards a level 2 learner - that is, a non-native speaker of French who has already undergone training in French basic skills. As such, all activities and information (with the exception of the dictionary, grammar table explanations, and help screens) are provided in the target language.

The aim of the exercises is to continually test, on

an individual basis, each learner's performance in order to determine areas of weakness. In addition, the ELMO system is learner-centered and provides the necessary flexibility and resources to accommodate various learning styles.

The ELMO system takes a non-directive approach to learning making the learner responsible for not only choosing the optimal pace and path through the learning sequence but for also accessing on-line resources when there is a gap between his/her knowledge and the ability to complete an exercise.

Two screens designated as primary and auxiliary screen are used during the operation of the ELMO course. The primary screen is principally used for exercise interaction and the auxiliary screen displays the resource information. A message on the primary screen is displayed when cursor control is on the auxiliary screen. The use of two screens helps to alleviate some of the limitations of presenting text on the computer.

A mouse with three dedicated buttons is used for all interactive sequences. The left button is used to make a selection, the middle button accesses the Help function, and the right button activates bottom line options making them available for selection. To operate the mouse, the user positions the cursor on the desired information on the screen and presses one of the buttons.

The screen components are designed to facilitate user interaction for each activity. On the primary screen, specific reserved lines are used to display skill (reading, writing, listening, and speaking) and activity options (See Figure 1). These are delimited by a different background colour from the rest of the screen. The user selects the skill area in which s/he would like to work and the activities for that skill are displayed on the second line in a horizontal menu. The selected skill area and exercise name are highlighted to provide the user with a constant reference to his/her location in the program. Line 23 is reserved for activity options which will vary from activity to activity and line 24 is reserved for activity information (e.g. number of selections, score, and page number). Error messages are displayed on the last line. In addition, several dedicated function keys are used to facilitate the interaction.

Each of the skill areas has some standard on-line resources and some specialized resources that are skill specific. The standard resources or utilities include a dictionary, a grammar reference, and objectives information. These utilities are available through function keys which the student can use as s/he is performing an activity.

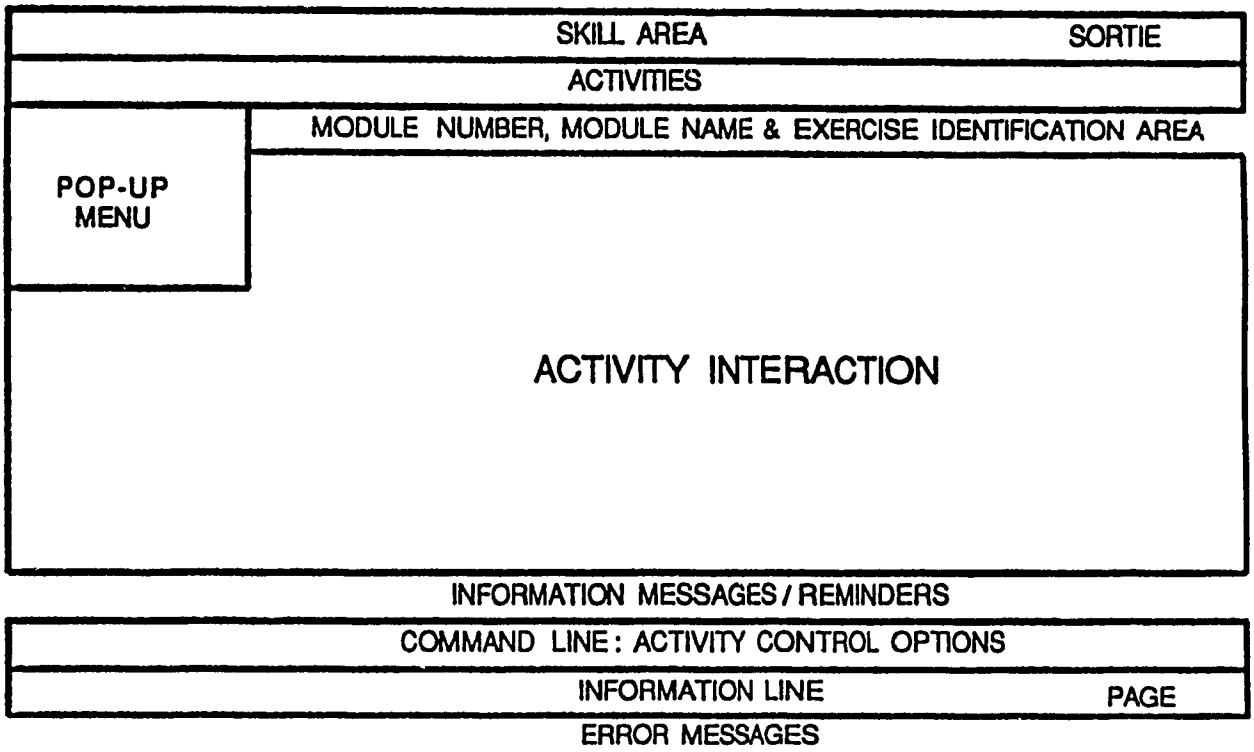

Figure 1 ELMO Screen Components

3.2 PRODUCTION

The module for this project was developed through a team approach. The team consiste of: an instructional designer, a French language expert, and a systems analyst. The author acted as the instructional designer and was responsible for designing the production, specifying and designing the interface for the computer interaction, and ensuring that the design specifications were met by both the French language expert and the programming team. The French language expert developed the course content according to the specifications outlined. A DND subject matter expert (SME) was responsible for evaluating and accepting the work. The systems approach model based on Dick and Carey (1978) was used in the course production.

3.3 SAMPLE

The target group consists of Anglophone officers within DND, who have had a minimum of two years experience in the forces. The average candidate is 20 years old and has a college degree. S/he has undergone and successfully passed a level 1 course in the target language at a military college. At level 1, the learner has sufficient comprehension to understand utterances about basic survival needs and minimum courtesy and travel requirements. In areas of immediate need or on

very familiar topics the student can understand and employ simple questions and answers, simple statements and very simple face-to-face conversations in a standard dialect. However, at this level there is still a strong interference from English when trying to express an idea in the target language.

The materials were designed for members of this population. However, they were unavailable for testing during the first stage of the Phase 3 evaluation period. However, according to the Microsift Evaluator's Guide (ICCE, 1983), it is possible to substantiate both the instructional and technical aspects of the product with students who are of a comparable age and ability to the intended users of the system.

The sample used for this study consisted therefore of university students studying French as a second language through a tutor. The tutor suggested candidates based on the ability level description of the target population.

3.4 PEDAGOGICAL GOAL

The pedagogical goal of this project was to help the learner build effective processing strategies needed for the global comprehension of a text. The reading materials were developed according to the processes outlined by Phillips (1984) for developing reading

strategies. The strategies that are used in this project include:

- Preteaching/Preparation
- Skimming and Scanning
- Decoding/Intensive Reading
- Comprehension Check

In addition to these strategies, the main reading passage was designed to allow readers to overtly interact with the written text through the hypertext process. Readers could request several categories of information including a grammatical explanation of key structures, a definition of key vocabulary, supplemental background information, illustrations, and contextual stylistic information.

3.5 TASK ANALYSIS

Based on the processes outlined by Phillips (1984), the following were identified as necessary for successful L2 reading comprehension:

Main Task:

Answer multiple choice question on the global comprehension of a text passage based on the following question types: noting facts, drawing conclusions, making inferences, seeing cause and effect relationships, and interpreting nuances of the contextualized language.

Sub-task 1:

Locate required information through language, content, and inference.

Sub-task 2:
Decode the essential elements of a passage through the grammatical function and meaning of words (micro level).

Sub-task 3:

Decode the cohesive and coherence elements of a passage by identifying the logical relationship of sentences within the passage (macro level).

3.6 OBJECTIVES

Based on the preceding task analysis, the following objectives were identified:

Performance Objective (PO)

Given a reading passage on the theme of the module, the student will demonstrate comprehension of the passage by correctly answering fifteen out of twenty multiple choice questions based on the content of the passage.

Enabling Objective (EO 1)

Given several paragraphs selected from the main reading passage, and 3 statements concerning the topic of each paragraph, the student will be able to select the one statement which expresses the main idea contained in that paragraph.

The student will have access to the dictionary and grammar utilities, as well as a hint option during interaction with the activity.

EO 2

Given a passage of between 50 to 100 words using similar lexical, semantic, and syntactic elements as the main reading passage and up to 19 lexical items extracted from the passage, the student will match the appropriate expressions with the corresponding blanks.

The student will have access to the dictionary and grammar utilities, as well as to the feedback option during the interaction with the activity.

EO 3

Given a passage containing sentence segments presented in a scrambled order, the student will reconstruct the text in a logical and coherent order. The sentence segments will have similar lexical, semantic, and syntactic elements as the main reading passage.

The student will have access to the dictionary and grammar utilities, as well as to a Hint option during the interaction with the activity.

3.7 THE MEDIUM

The typical procedure within the Instructional Design Process is to select the medium after task specifications have been established (Gagne & Briggs, 1974; Dick & Carey, 1978). However, because the ELMO project had been established, in part, to determine if CALL technology would improve the efficiency and effectiveness of language learning, the medium was selected prior to the contractual agreement with the client.

The choice of which system to use and the system architecture was based on the specific requirements of the ELMO system outlined in the Statement of Work (SOW). The ELMO system hardware consists of 6 individual work stations connected together via a comprehensive network system. Each work station is capable of operating completely independently of the central station such that a failure at any one station will not affect the overall system operation effectiveness.

Every work station consists of the following items:

1. An IBM PC/AT compatible computer to control the exercise execution/preparation.
2. A primary screen for the display of the training material.
3. An auxiliary screen to supplement the operation of the primary screen.
4. A keyboard and a mouse to permit flexible user interactive control of the system.
5. A video disc system to provide storage for both the still-frame and linear frame video for the training material.

3.8 DESIGN DOCUMENTS

After the objectives had been established, two design documents were developed: 1) The Module Specification Document (MSD) and 2) The Operational Sequence Design Document (OSDD).

The MSD established the module theme and outlined the module content based on the task analysis and objectives. It also identified the general language structures, grammar and vocabulary that would be included in the module. The content outline was dictated by the module objectives and the stated specifications of the client based on the requirements of the target population.

The OSDD was based on the Statement of Work issued by the client. This document specified the technical and instructional designs of the courseware. For areas not dictated by the SOW, technical decisions were determined

by current learning theory of CALL, ease of operation, and software and hardware limitations.

Instructional design decisions were motivated by both the SOW and another document provided by the client which outlined the philosophy of the ELMO system.

According to this philosophy, the computer should not compete with man in areas where man is superior. It is man that must have control over the machine - not vice-versa. In the ELMO system, the computer functions as a tool as opposed to a tutor. This strongly suggests a learner-centered system. In order to maximize student autonomy, certain utilities aimed at facilitating comprehension and completion of exercises, are available. ELMO is also a diagnostic system whose purpose is to continually test each learner, identify deficiencies, and measure his/her progress.

The ELMO system, therefore, has a very limited tutorial component. This has impacted design elements of the computer instruction including type and degree of feedback, control and branching.

The feedback, instead of offering explanatory comments, simply tells the user if an answer is correct or not. If a user experiences any difficulty, there is always a human tutor available for help.

ELMO is a learner-centered system with the student maintaining control over most aspects of the learning

situation. Therefore, the system uses student controlled branching in which the user can access a number of resources such as the dictionary and the grammar reference.

3.9 MATERIALS DEVELOPMENT

The module theme, The Falkland's Islands War, has been selected for the main reading document because of its subject matter interest to the target audience. This theme will recur throughout the module as each activity is undertaken. The reading document will later be used as a source of information for later activities in the writing and speaking skills area.

The reading skills component consists of five main activities. The activities are designed to successively build skills necessary for the comprehension of a reading document. Because each activity functions differently, students have access to a Help facility to provide basic instructions on the operating mechanics of the selected activity. The reading activities are invoked by selecting the reading option from the vertical choice option list.

The reading passage consists of a document based on a real-life situation which is meaningful and relevant to the student. The following activities, which incorporate the strategies outlined by Phillips (1984), are included in the reading skills area to facilitate the global

comprehension of the text: Lecture Active (Active Reading), Idée Principale (Main Idea), Lacunaire (Cloze), Reconstruction (Sentence Shift), and Compréhension du Texte (Text Comprehension). The activities are designed to permit students to make changes to their answers before asking for the solution and generally to maintain control over the parameters of their learning. (See Appendix A for activity descriptions and sample screens).

In the first activity, Lecture Active, the student is first presented with seven open-ended questions. The questions are designed to direct attention to the relevant sections of the discourse, help organize the input, activate student background knowledge, and build expectancies for the type of information that will be encountered in the text. This activity corresponds to the reading preparation stage outlined by Phillips (1984).

Students are not required to answer the questions which serve as an advance organizer. However, it is suggested in the Help utility that they skim through the text for the answers. Adjunct aids, made available through hypertext (see section 2.4 for an explanation of hypertext), help readers to comprehend the text. These include the request for the definition of key vocabulary, supplemental background information, grammatical explanations, and illustrations. Each of these are recognized factors in reading comprehension. For example,

there is a strong relationship between vocabulary knowledge, comprehension, and text difficulty (Anderson & Freebody, 1981). The positive effects of a reader's background and supplemental knowledge to comprehension has also been confirmed (Blohm, 1982). In addition, the link between knowledge of the language structure and the ability to decode text has been well-established (McDonell, 1973; Yorio, 1971). Finally, visuals provide the redundancy or supplementary cues referred to by Omaggio (1979) and Krashen (1984) that help to increase reading comprehension.

In the next activity, Idée Principale, the student must discriminate between key and support ideas in the reading passage. This activity corresponds to the scanning stage outline by Phillips (1984) in which readers attempt to locate specific information.

The Lacunaire activity requires the student to match deleted expressions with appropriate blank spaces in a text. To do this requires intensive reading to understand the structural and semantic link of key ideas and word relationships within the text. This activity is related to the decoding stage described by Phillips (1984).

The next activity, Reconstruction, requires the student to reorder sentence segments in a logical and coherent order. This exercise requires cognitive

processing similar to the Lacunaire exercise. However, the Lacunaire activity requires a knowledge of coherent and cohesive discourse at the word level and the Reconstruction activity works at the sentence and paragraph level.

Finally, the Compréhension du texte activity requires the student to answer comprehension questions which test their global understanding of the reading passage. This activity corresponds to the comprehension stage described by Phillips, 1984.

Chapter 4

FORMATIVE EVALUATION

4.1 ELMO FORMATIVE EVALUATION PLAN

A formative evaluation is typically conducted in three different phases to obtain information in order to revise an educational product while it is being developed. The Ontario Educational Software Service (OESS) (1986) has outlined a 3 phase evaluation plan which coincides with the important stages in software development.

Phase 1 of the evaluation is conducted while the product is still in its conceptual stage. The information gathered during this phase is used to detect problems in the software and to suggest issues that need to be examined in subsequent testing with users during evaluation phases two and three. Phase 2 or the try-out stage is conducted once the first draft of the courseware is on the computer. The purpose of this stage is to debug the software and correct any obvious problems. Phase 3 or the field-test trials occurs once all obvious problems have been corrected and when the courseware is running reliably and is close to its final form. The purpose of this stage is to find out if the program accomplishes, in an exemplary way, the purpose(s) for which it was designed and also to identify those key areas in software

that need revision. During each phase, three major facets of the software are examined: its content, its technical design, and its instructional design.

Due to the contractual agreement with the client, a somewhat modified approach to the OESS model was adopted. The differences lay with the some of the procedures and strategies that were followed to obtain the required data (there was only one formal try-out) and whith the types of reviewers that were used, members of the target opopulation not being available to provide information on content features such as length and difficulty. Ideally, representatives of the target population would provide more accurate feedback information.

During the third phase of an evaluation, the courseware is typically tested with a large group of intended users in the setting(s) where it will be used. The major function of this phase is to find if the program achieves the purpose(s) for which it was designed. The sample size should therefore be large enough to gauge learning outcomes through statistical analysis. Participants should be representative of the intended user group and randomly selected to ensure the generalization of the findings to the entire target population. Only by using samples from the target population will the derived data provide relevant information necessary to shape and revise the product.

An examination of phases 2 and 3 reveal differences in terms of purpose, location, number of subjects, evaluator, status of system, and type of data collected. (See Figure 2). The important difference between these two phases is one of substance. Although their general intent is to detect problems in the software to enhance the instructional effectiveness of the product, the extent to which they do this is ultimately determined by the data instruments that are used and types of data collected.

It is our intent to exploit these differences in a combined try-out and field test stage to develop a preliminary analysis of the courseware in order to derive the following information.

1. the adequacy of its instructional design;
2. the suitability of the material to the computer;
3. its technical reliability;
4. its ease of use and ease of learning; and
5. system strengths and weaknesses.

A full phase three evaluation was beyond the scope of the contract and will be performed by the client. Due to the inaccessibility of target population subjects, the site where the courseware will be used, and lack of an external evaluator, a field trial evaluation was not possible. A full statistical analysis therefore cannot be

presented at this time.

The aim of this study however, was to go beyond the try-out stage of an evaluation which aims to correct obvious problems with the software. This was accomplished by combining aspects of the second and third phases of the evaluation. In this way, we expect to determine the extent to which the instructional design and technical design decisions were satisfactory. The content is pertinent only with respect to the target population and will not be commented on in this study.

	PHASE 2 TRY-OUT	PHASE 3 FIELD TEST
PURPOSE	Debug program Correct obvious problems	To find if program accomplishes the purpose for which it was designed
No. OF SUBJECTS	Small Group (5 - 15)	Large group (20 +)
STATUS OF SYSTEM	Operational with bugs	Running reliably
LOCATION	At developer's	On-site where it will be implemented
TYPE OF DATA	Qualitative	Qualitative & Quantitative
DATA INSTRUMENTS	Questionnaire	Natural observation Student interview Assessment of learning outcomes
EVALUATOR	Internal	External

• The number of subjects is not indicated in the OESS manual. However, Golas, K. 1983 suggests using 5-15 subjects for the try-out stage and 20 or more subjects for the field-trial tests.

Figure 2 Contrast between Phase 2 and Phase 3 of a formative evaluation

Chapter 5

METHODOLOGY

5.1 INTRODUCTION

A formative evaluation of the ELMO system was conducted at three different times during critical periods in the development of the product with different reviewers were responsible for evaluating the instructional and technical aspects of the program. The instructional design aspect of the evaluation focused on the utilization of the capabilities of the computer in presenting the pedagogical content. The technical design aspect of the evaluation focused on the program's output as well as its potential "user- friendliness".

Revisions to the software were made after the results were submitted to the design team (see Figure 3). Some selected revisions from the final evaluation should be implemented prior to the programme's being tested on the target population. Other proposed revisions should be discussed with the end users before a decision is made to implement them. These factors are discussed in further detail in Chapter 6, Discussion and Recommendations- Phase 3.

5.2 PROCEDURE

PHASE 1

The first phase of the evaluation was conducted

while the product was still in its conceptual stage of development. The OSDD document (see 3.8 for a description), which delineated the instructional and technical design aspects of the courseware, was submitted to an evaluator proposed by the client. For expediency, this person shall be referred to as the subject matter expert (SME) although his expertise extends beyond the subject matter to knowledge about both instructional and technical design. He is also the person behind the conception of the ELMO project.

The proposed instructional design was reviewed in terms of its relative adherence to the philosophy of the ELMO system (see section 3.8) and its potential effectiveness with respect to relevant language learning theory and CALL research. Features such as computer suitability for the proposed activities, cognitive supports (e.g. feedback, hints), branching, proposed screen displays, types of illustrations, and the use of special effects such as colour and highlighting were examined.

The technical review was conducted to both assess the feasibility of the technical design and suggest ways in which the program could be made easier to operate. Both ease of use and ease of learning how to operate the system were the barometers by which the technical aspects of the ELMO system were measured.

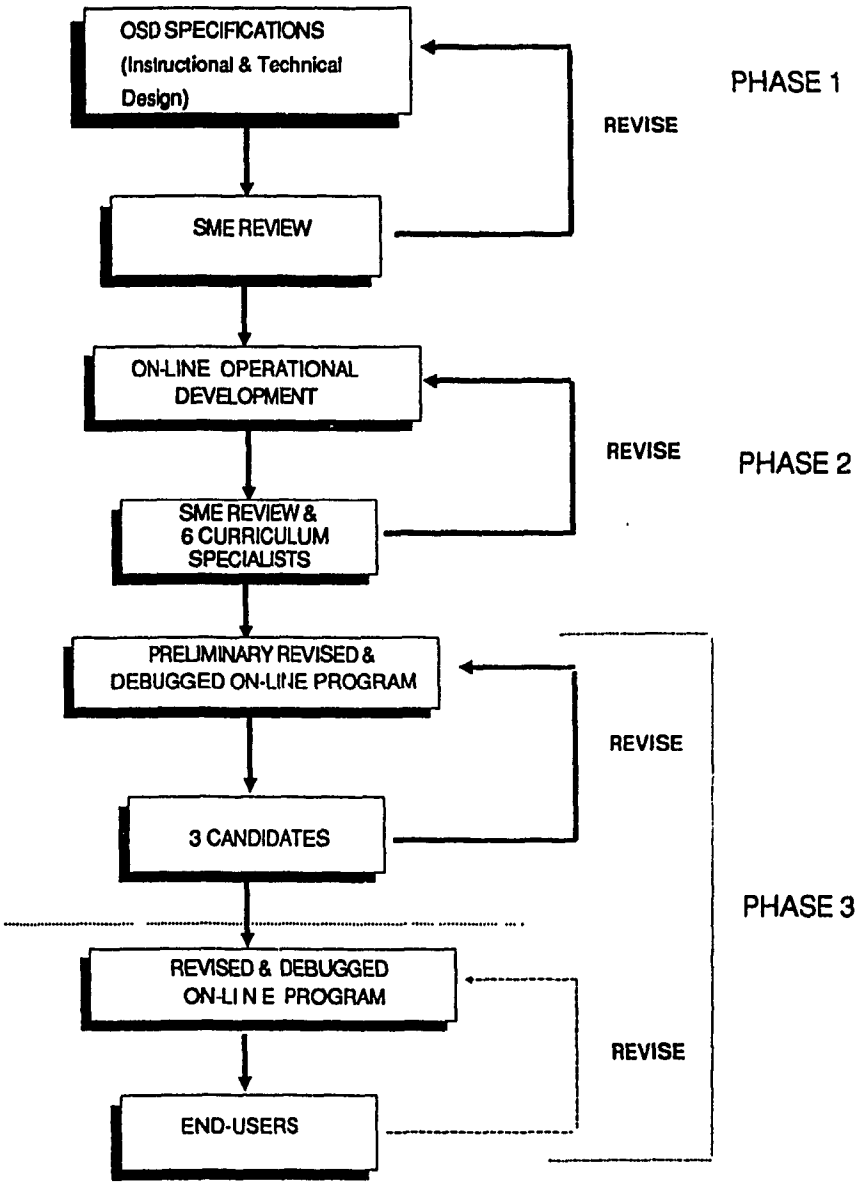

Figure 3 ELMO formative evaluation phases

At the end of the Phase 1 evaluation, a meeting was held with the client to determine which changes would immediately be implemented and which potential problems would be "flagged" for further study during subsequent stages of the evaluation.

According to the contractual agreement, no further investigation would need to be conducted on the instructional or technical design aspects of the module until the on-line operational development.

PHASE 2

The second phase of the evaluation began once the first draft was developed on the computer. Six specialists with expertise in curriculum development reviewed the on-line activities. These specialists were appointed by the client to perform an in-plant acceptance test of the product. Some had previous experience with CALL and others were novices. In addition, the SME also participated in this review stage.

The testing was conducted at the company site by six simultaneous users on the system. The author was able to spend approximately one day with each subject to clarify any points of confusion and note any problems encountered with the courseware, the instructional design, and the technical operation. The subjects followed the Acceptance Training Plan document which offered step-by-step

guidance in interacting with the system.

Instructional aspects included a review of the proposed screen displays in terms of text presentation and design elements such as graphics and colour. Technical areas such as the consistency and logistics of formats and protocols for communication to the user were also examined. Any observed problem areas were noted.

The results of the evaluation were collated and submitted to the company. A meeting was held with the client and the proposed changes were assigned to one of two categories: 1) required changes 2) changes to be studied. (Any design features previously agreed to in the OSDD document could not be changed). The required changes consisted of operational bugs or incorrect spelling, grammar, or other obvious problems. The second category of changes involved issues that had not been addressed in either of the specification manuals. The suggested changes were weighed in terms of instructional effectiveness and the cost impact of implementing the modifications. Some of these problem areas were to be resolved through experimentation in the subsequent evaluation phase.

PHASE 3

For the purposes of this thesis equivalent, another group of subjects representative of the target population

(similar in age and ability) undertook the formative evaluation in much greater depth than in the previous phase. The purpose of this review was to assess the adequacy of the revisions that had been made up to this point, to assess the instructional and technical design decisions that had been made, and to identify general strengths and weaknesses of the system.

Phase 3 of the evaluation began after revisions based on the previous review were made and the program was running reliably. The review was conducted at the company's site with a group of three subjects studying French as second language. The author acted in the capacity of evaluator.

A pretest was administered to screen candidates and to ensure that the ELMO tasks were commensurate with their language abilities. It consisted of a reading passage and a twenty item comprehension test (See Appendix B). The reading passage contained the same theme and had similar structures, vocabulary, and grammar as the module reading passage. It was administered before undertaking the module and the candidates were not permitted to use outside resources (e.g. dictionary).

After consultation with their French language tutor, it was decided that those scoring between 8 and 15 out of 20 on the pretest would be the most suitable subjects. Three of the group tested fit these specifications and

they proceeded to complete the rest of the test instruments.

Before going through the materials, each candidate was given brief instructions on the operation of the ELMO system. During the test trial, the candidates operated the program with only limited intervention by the evaluator.

Three types of data instruments were employed during this phase: natural observation, questionnaire, and interview.

The main purpose of the observation was to note candidates' reaction to the various aspects and features of the program. Particular attention was paid to specific instances in the program in which the candidate reacted with confusion, boredom, impatience, frustration, etc. Aspects of the design that appeared to make the program more interesting, understandable, and instructive were also noted.

The questionnaire and interview provided information on the instructional and technical aspects of the program as well as its strengths and weaknesses.

After completing the module, candidates were given the questionnaire to complete. They were then interviewed about the problem areas noted during the observation and indicated in the questionnaire.

As stated previously, this thesis equivalent will

not address the extent to which the program accomplished the purpose(s) for which it was designed. In order to do this a sufficient number of candidates representative of the target population would have to be used.

The data collected from this phase were used to assess preliminary reactions to the instructional and technical designs of the program as well as its strengths and weaknesses.

Chapter 6

RESULTS AND DISCUSSION

6.1 INTRODUCTION

The results of the formative evaluation are presented in two sections. The first section concerns the findings and revisions of Phases 1 and 2 of tne evaluation; the second section provides the data and discusses the results and makes recommendations based on the Phase 3 evaluation.

6.2 RESULTS AND DISCUSSION - PHASE 1 AND PHASE 2

PHASE I

In general, there was favorable reaction to the instructional and technical designs of the courseware during Phases 1 and 2 of the formative evaluation.

The instructional design with respect to student interaction and cognitive supports closely adhered to the ELMO philosophy which supports the premise that the computer should not try to duplicate mental processes of man. Specifically, the computer should not take over the role of the tutor - an area in which a person is by far superior. Since the reviewer in the first phase of the evaluation was conducted by the originator of the ELMO project, revisions to the instructional design were minor in nature. These changes involved displaying the paragraph with the answer as part of the feedback in

Compréhension du Texte, adding a hint option to the Idée Principale activity, and using units of thought rather than complete sentences in the Reconstruction activity.

With respect to the technical design, two major changes were proposed after reviewing the OSDD document. To make the system more user-friendly, it was suggested that the cursor be allowed to move anywhere on the screen to activate an option choice. In the proposed design, the user had to first press <ESC> or a function key to move to the option choice areas. Secondly, it was recommended that two colour monitors be used instead of using one colour and one monochrome monitor, which were not as ergonomic.

After a very thorough investigation by the design team, it was decided that neither change was technically feasible. The first problem could not be resolved due to the technical complexity of a two screen system. This imposed restrictions on using the full utilities of the mouse. The second problem could not be resolved because of the PC design constraint.

PHASE 2

During Phase 2 of the evaluation, six curriculum design specialists were involved in reviewing the instructional and technical design of the product once it was developed on-line.

The instructional design feedback was limited to screen design aesthetics and special features such as colour since design structure decisions had already been approved by the client. Suggested modifications included: using the upper case "É" instead of the lower case "é" for the skill and activity level menu names; extending the blue background colour of the page indicator to go across the entire screen; and repositioning the command line activity options to make the screen more balanced.

The technical area was reviewed in terms of system crashes, process errors, and ease of use/ergonomics. No system crashes occurred. However, ten process errors were discovered including: incorrect Help screens being displayed, text remaining on screen after a screen was refreshed, incorrect error messages, options not working properly, endless loops, defaults of cursor location after <ESC> is pressed, the display of several cursors on the screen at one time, and the system default to an English keyboard. All problems were corrected with the exception of the last one. The constraint of the hardware impeded changing the default to a French keyboard.

Six problems were identified in the ergonomic area including: storage of key strokes in buffer, system response time to implement a command, cursor movement on screen, knowing whether a utility was active, numbering question items, inability to page the cloze passage in

Lacunaire exercise from the pick-list window.

In general, the biggest major concern was the storage of keystrokes in the buffer. In some instances, system operations would take several seconds and no observable action would occur on the screen. The user, unaware that the system had accepted the command, would repeat the same keystroke several times. This lead to some confusion when the results of the commands were processed. A solution to the problem involved modifying the software to allow for the storage of only one keystroke during an operation that was being processed. To remediate the response time problem, a "Wait" message would be displayed during operations in which no observable action occurred within 2 seconds.

Another area of concern involved the cursor movement on the screen within the Lecture Active activity. In attempting to select a highlighted expression from the text, the cursor would often "fall" off the line where the expression was located resulting in a lot of frustration for the user. A software solution to this problem would be achieved by eliminating blanks while typing in the text during the authoring process.

The last problem involved knowing whether or not a utility option had been selected. A highlighting bar is used to cue the user when the command line (with the activity options) is active. It is also used to indicate

that an activity option has been selected. This dual function of the highlighting bar is confusing to the user. To remedy this situation, it was proposed that a message, advising the user that a utility is active, be displayed after a utility is selected.

6.3 RESULTS AND DISCUSSION - PHASE 3

Phase 3 of the evaluation began after obvious problems with the system were corrected and the program was running reliably. Data from this evaluation were collected from three sources: natural observation, questionnaire, and student interview. Tables 1, 2, and 3 report the data collected during the evaluation sessions. The data for this study were then used to analyze the ELMO system in terms of:

1. the adequacy of its instructional design;
2. the computer suitability of the material;
3. its technical reliability;
4. its ease of use and ease of learning; and
5. program strengths and weaknesses.

Adequacy of the instructional design

The instructional design component of the evaluation focused on the utilization of the computer in presenting the pedagogical content. Features that were explored included the adequacy of the feedback and hints, the

TABLE 1

Notes on observation of candidates during ELMO Sessions

- All 3 candidates preferred using the keyboard to the mouse.
- All 3 candidates attempted to use the <Enter> key instead of <F1> to select.
- Candidates seemed more attentive doing the Lacunaire and Reconstruction activities than the other activities which are more traditional and less game-like.
- Candidate 1 appeared to be frustrated when a lexical item was not available in the Dictionnaire.
- None of the candidates used the Référence Grammaticale resource outside of the Lecture Active activity.
- All of the candidates seemed to fully understand the instructions in the Help utility (instructions on how to interact with an activity).
- All 3 candidates appeared to understand the colour-coded feedback. However, 2 of the candidates were a bit confused by the feedback in the Compréhension du Text activity.
- All candidates were enthusiastic about the existence of the illustrations. Howsever, they were also disappointed in the quality.
- Two of the candidates were initially confused by accessing and the procedures used to operate of the Dictionnaire and Référence Grammaticale.
- Two of the candidates were puzzled after selecting a utility in Lecture Active from a particular screen and no highlighted words appeared.

- All 3 candidates tried to exit from the skills menu using the <Esc> key instead of selecting the <Sortie> option.

- Two of the candidates appeared impatient because of the slowness of the system.

- There was some initial confusion by all 3 candidates on how to exit from the auxiliary screen.

- There was some initial confusion by all 3 candidates when an unauthorized operation was selected and a "beep" sounded.

TABLE 2

ELMO system questionnaire and responses

INSTRUCTIONS:

Rate the following statements using the criteria below:

SA = Strongly Agree **A** = Agree D = Disagree **SD** = Strongly Disagree

I. *THE INSTRUCTIONAL DESIGN*

Feedback

The feedback provides sufficent guidance in:

Lacunaire	**SA**	**A** 3	D	**SD**
Reconstruction	**SA**	**A** 3	D	**SD**
Idée Prcpl	**SA** 2	**A** 1	D	**SD**
Comp du Texte	**SA**	**A** 1	**D** 2	**SD**

Hint

The hint option provides sufficient guidance in:

Idée Prcpl	**SA**	**A** 3	D	**SD**

Presentation of Content

The information is clear, logical, and well-organized in:

Lecture Active	**SA**	**A** 3	D	**SD**
Commentaires	**SA**	**A** 3	D	**SD**
Expressions	**SA** 3	**A**	D	**SD**
Réf Grammaticale	**SA**	**A** 3	D	**SD**
Dictionnaire	**SA**	**A** 3	D	**SD**

I. *THE INSTRUCTIONAL DESIGN*

Presentation of Content (cont'd)

Examples and counter-examples are used when possible and appropriate.

SA	A	D	SD
	3		

The examples are relevant to the point of instruction.

SA	A	D	SD
	3		

Information displays

The functional areas on the screen (skill area menu, activity choice menu, option choice menu, and the activity displays) are easy to distinguish.

SA	A	D	SD
2	1		

There is adequate spacing on the screen in:

	SA	A	D	SD
Lecture Active		1	2	
Idée Prcpl	SA	A	D	SD
	2	1		
Lacunaire	SA	A	D	SD
		3		
Reconstruction	SA	A	D	SD
		3		
Comp du Texte	SA	A	D	SD
	3			
Other:	SA	A	D	SD
	(Réf Gram)		2	1

There is too much information on the screen in:

	SA	A	D	SD
Lecture Active		2	1	
Idée Prcpl	SA	A	D	SD
			2	1
Lacunaire	SA	A	D	SD
			3	
Reconstruction	SA	A	D	SD
		1	2	
Comp du Texte	SA	A	D	SD
			1	2
Other: _____	SA	A	D	SD
	(Réf Gram)		3	

I. *THE INSTRUCTIONAL DESIGN*

Illustrations and Colour

The illustrations focused attention on the important content areas in the text.

SA	A	D	SD
	3		

The illustrations are helpful in understanding the reading passage.

SA	A	D	SD
	1	2	

The colour used for the text and background make the screen displays attractive and easy to read.

SA	A	D	SD
	3		

The use of colour adds to the effectiveness of the instruction.

SA	A	D	SD
	1	2	

The green and red feedback colours for correct and incorrect answers were easily remembered and understood.

SA	A	D	SD
1	2		

The illustrations effectively illustrate the intended concept.

SA	A	D	SD
	2	2	

The illustrations have appropriate quality and clarity.

SA	A	D	SD
			3

Computer Suitability

The exercises provide a more active than passive role in the learning process.

SA	A	D	SD
3			

I. *THE INSTRUCTIONAL DESIGN*

Computer Suitability (cont'd)

The computer presents the lesson more effectively or efficiently than any other means of instruction e.g. film, text book, etc., in:

Lecture Active	**SA** 3	**A**	**D**	**SD**
Idée Prcpl	**SA** 1	**A** 2	**D**	**SD**
Lacunaire	**SA** 3	**A**	**D**	**SD**
Reconstruction	**SA** 3	**A**	**D**	**SD**
Comp du Texte	**SA**	**A** 3	**D**	**SD**

The capabilities of the computer are effectively utilized e.g. feedback, branching, evaluation, text manipulation, etc., in:

Lecture Active	**SA** 3	**A**	**D**	**SD**
Idée Prcpl	**SA** 1	**A** 2	**D**	**SD**
Lacunaire	**SA** 1	**A** 2	**D**	**SD**
Reconstruction	**SA** 3	**A**	**D**	**SD**
Comp du Texte	**SA**	**A** 1	**D** 2	**SD**

The Dictionnaire utility makes effective use of the capabilities of the computer. i.e it uses unique aspects of the computer.

SA	**A**	**D**	**SD**
	2	1	

The Réference Grammaticale utility makes effective use of the capabilities of the computer.

SA	**A**	**D**	**SD**
	3		

II. *TECHNICAL CHARACTERISTICS*

General Program Operation (cont'd)

The mouse buttons function appropriately.
(e.g. Select, Help, Activate)

SA	A	D	SD
3			

The system response time for implementing a command is acceptable.

SA	A	D	SD
		3	

The program responds correctly as described in the Help information.

SA	A	D	SD
3			

The on-line Help facility contains adequate instructions on how to interact with:

	SA	A	D	SD
Lecture Active		3		
Idée Prcpl		2		
	1			
Lacunaire		3		
Reconstruction		3		
Comp du Texte		3		

It is easy to move through the program
(e.g. return to menus, move to another segment of the program, change activities, exit)

SA	A	D	SD
	3		

Ease of use

A. Transparency

It is possible to exit from a program operation whenever required.

SA	A	D	SD
	3		

II. *TECHNICAL CHARACTERISTICS*

Ease of use (cont'd)

The following program utilities are available whenever required.

Help	**SA**	**A**	**D**	**SD**
	3			
Dictionnaire	**SA**	**A**	**D**	**SD**
	2	1		
Réf Grammaticale	**SA**	**A**	**D**	**SD**
	2	1		

B. Consistency and Predictability

Making selections e.g. menu options, answers, etc., is logical and consistent throughout the ELMO system.

SA	**A**	**D**	**SD**
	3		

Exiting from an activity or program operation is logical and consistent throughout the ELMO system.

SA	**A**	**D**	**SD**
		1	2

The procedures for accessing and interacting with the following utilities are consistently and logically applied:

Commentaire	**SA**	**A**	**D**	**SD**
	2	1		
Expressions	**SA**	**A**	**D**	**SD**
	2	1		
Illustrations	**SA**	**A**	**D**	**SD**
		3		
Réf Grammaticale	**SA**	**A**	**D**	**SD**
			3	
Dictionnaire	**SA**	**A**	**D**	**SD**
			1	2
Help	**SA**	**A**	**D**	**SD**
	2	1		

II. *TECHNICAL CHARACTERISTICS*

C. Familiarity

Interacting with the program uses similar keys or actions as other computer programs.

SA	A	D	SD
	2	1	

It is preferable to have directions in the Help facility than the more traditional method of having directions within the activity itself.

SA	A	D	SD
		3	

D. Orientation

The skill area, activity menus, and/or screen titles help to identify location in the module. (where you are, where you are going, or how to get somewhere else)

SA	A	D	SD
	3		

There is no difficulty perceiving when cursor control is on the primary screen or auxiliary screen.

SA	A	D	SD
	2	1	

E. Simplicity

The program can be used by a person with minimal computer expertise.

SA	A	D	SD
	2	1	

The operation of the following utilities is not overly or unduly complex.

Commentaire	SA	A	D	SD
		3		
Expressions	SA	A	D	SD
		3		
Illustrations	SA	A	D	SD
		3		
Réf Grammaticale	SA	A	D	SD
		2	1	
Dictionnaire	SA	A	D	SD
		1	2	
Help	SA	A	D	SD
		3		

II. *TECHNICAL CHARACTERISTICS*

E. Simplicity (cont'd)

The computer operation (knowing how to interact with an item) does not interfere with concentrating on the activity?

SA	A	D	SD
	1	2	

The context sensitive Help is easy to understand.

SA	A	D	SD
2	1		

Error Messages are clear and unambiguous. i.e. they provide clear and easy directions on how to effectively use the program.

SA	A	D	SD
	2	1	

F. Control

There are program supports over which I would like more control? e.g. Halting a process, repeating it, skipping it, returning to it, etc.

SA	A	D	SD
		3	

G. Cognitive supports

The Dictionnaire, Référence Grammaticale and Help utilities should be .epresented as options on the command lin nstead of as function keys.

SA	A	D	SD
	3		

H. Psycho-motor supports

The cursor is easy to manipulate with the mouse.

SA	A	D	SD
		2	1

It is easier to interact with the program using the keyboard than the mouse.

SA	A	D	SD
1	2		

Program strengths and weaknesses

Please complete the following questions.

What do you like most about the module?

"I liked the colours and the sense of playing a game-seeing if you could get right answers. I also liked access to the dictionary."

"I liked the exercises where you could fill in blanks by moving words and the exercise that allowed you to move sentences around.
" The availability of the grammar and dictionary. These are important tools to have when learning a language. They also make this program more comprehensive than other programs I've used."

What do you like least about the module?

" The number of operations and the time it took to get back and forth between operations; but this would get easier with use."

"The illustrations."

"The mouse was difficult to use and trying to look-up a particular word in the dictionary. The words I was looking for were often not in the dictionary."

Is there anything that you would do to make interacting with the program easier?

I'd try to make the computer [program operations] work faster."

"No"

"Seems to be a problem with the mouse. At times, a lot of travel is needed to move the cursor and at other times, very little travel is needed."

Program strengths and weaknesses (cont'd)

Are there any parts of the program or any design features (e.g. screen formats, commands, sequencing, feedback) that adversely affect learning or make the program difficult to use.

"Some of the screens were littered with too much text."

"Not enough feedback in the Comp du texte exercise.

"Using the mouse was frustrating. I would also add a lot of words to the dictionary."

Is the program suitable for use on the computer? Why or Why not?

"Yes. I liked the exercise that you could select words from the screen. I especially liked the explanations for expressions [Expressions utility]- the layout makes it easy to see the contrast between French and English forms."

"Yes, especially the exercises in which you could move words or sentences and easily change the answer."

Are there any tools or utilities not available that you would like included in the program?

"I can't think of any."

"I've done some exercises on the computer that use branching. That might be useful for ELMO."

"No. I think the program is comprehensive."

Do you find the activities helpful in understanding the reading passage?

"Yes and fun."

"Yes"

"Yes"

Do you have a positive attitude about using the ELMO program?

"Yes"
"Yes"

"Yes"

TABLE 3

Interview questions and answers

I = Interviewer C = Candidate (1,2,or 3)

I: You used the keyboard instead of the mouse. Was there a particular reason?

C1: I'm more familiar with the keyboard.

I: In the questionnaire, you mentioned that the Lecture Active screens were too crowded. How would you make them less crowded?

C1: There's too much text on the screen. I would put less text. You could also get rid of the skill area line after a skill has been selected. You don't really need it.

I: You also indicated that other screens were crowded. Do you remember which ones?

C1: The Grammar screens in particular.

I: In the Lacunaire activity, the activity in which you fill in the blanks with selected words, you stated that the feedback was not adequate. What would you suggest?

C1: The feedback was fine but to make the exercise a little bit easier you could have a hint option. For each blank, the hint could identify whether a noun, verb, adjective etc. was needed.

I: You seemed a bit perplexed after selecting the "Expressions" utility and no highlighted words appeared on the screen. There is a message on the screen telling the user that this utility is active.

C1: I thought it [Expressions utility] might not be working even though the message was there.

I: Would it be sufficient to caution the student about this problem in the student manual?

C1: Yes.

I: In the questionnaire, you suggested that there was a problem with colour. What exactly were you referring to?

C1: After getting the feedback during a multiple choice question, it was hard to distinguish between the red [incorrect] and magenta.

I: Overall, would you say you were more active than passive during the exercises.

C1: Definitely more active even in the first reading activity. I liked the way in which the reader could get all kinds of information about the text.

I: I noticed that you had a few problems using both the dictionary and grammar reference. Why was th.t?

C1: I found the two ways of using both the dictionary and grammar reference (direct and indirect methods) a little confusing. I couldn't remember which one to use.

I: Would you care to add any other comments?

C1: I can't think of anything right now.

I: You mentioned in the questionnaire that the Lecture Active activity had too much information on the screen and appeared crowded. One of the candidates suggested that the skill area menu be replaced with the activity menu after choosing a skill. What do you think of that solution.

C2: It's a good idea but the screen will still be crowded. You need to have less text on the screen.

I: In the questionnaire, you mention that you liked the content presentation in the Lecture Active activity. Could you explain a little more about this?

C2: I liked the presentation of the information in the Expressions utility. There weren't a whole bunch of words to read but you could understand the ideas.

I: What about the other crowded screens you make reference to in the questionnaire?

C2: I think you could improve the appearance of the screens by spacing out the option choices so that the screen has more balance.

I: There was a problem with the "Illustrations" utility. After you selected it and no expressions were highlighted, you seemed unsure of how to proceed.

C2: I thought that it wasn't working.

I: If we warned students in the manual about this problem, would that be sufficient.

C2: As long as they read the manual.

I: With respect to the illustrations, you stated in the questionnaire that they were not helpful in understanding the reading passage. Could you suggest any reasons why they weren't helpful.

C2: They were more distracting than helpful because the image was vibrating a lot and the maps were very difficult to read because of the poor quality.

I: If these problems were corrected, would the illustrations be more useful?

C2: Yes, I think so.

I: In the Lacunaire exercise, the one where you must fill in blanks by selecting words from the pick-list, another candidate suggested that the exercise contain a hint option. The hint, when requested, would give the user the part of speech for a selected blank. What do you think about this idea?

C2: I don't think that would be helpful. This would require a knowledge of grammar with which not everyone is familiar.

I: You mention in the questionnaire that the computer capabilities were not effectively utilized in the Compréhénsion du Texte activity. Would you expand on this?

C2: The feedback in this exercise didn't explain why my answer was wrong. It's important to tell the student why - not just show them where the answer is.

I: In general, would you say that you took a more active than passive role in the activities?

C2: Yes.

I: In the questionnaire, you refer to problems operating the dictionary and grammar reference. What made these utilities particularily difficult to operate?

C2: Well, the dictionary worked differently than the other options [no expressions were highlighted] and so I wasn't sure what to do after I selected it.

I: What about the Grammar Reference?

C2: You had to press the <Esc> key too many times in order to exit.

I: Do you have any other comments you'd like to make?

C2: No, not right now.

I: I noticed that you preferred using the keyboard to the mouse. Was there any reason?

C3: The mouse was difficult to use especially in the first activity where you had to select words off the screen.

I: One of the candidates suggested that to make the screen less crowded, the skill area menu be replaced by the activity menu once a skill has been selected. In other words, the skill area menu will not be displayed after it is selected. What do you think of this idea?

C3: No, I like the reminder of the skill area to be there.

I: One of the previous candidates pointed out that a hint option might be useful in the Lacunaire exercise - the one in which you fill in blanks by words selected from a pick-list. The user would be able to ask for a hint for each blank and get the part of speech that belonged in the blank - for example a noun, verb, etc. What do you think about this idea?

C3: I don't know if it would be that useful. A lot of people don't know their grammar well enough to find this useful.

I: Another thing that was mentioned was the magenta colour for option letters in multiple choice questions. Did you find it a problem distinguishing between the magenta and the red feedback colour.

C3: It was sometimes confusing.

I: In the questionnaire, you suggested the computer capabilities were not effectively utilized in the Comp Du Texte activity. Would you explain your answer.

C3: For the other activities I think that the feedback was simple but adequate. However, in the Comp du Texte activity, I think you should have an explanation about a wrong choice.

I: What in particular did you find difficult about operating the dictionary and grammar reference?

C3: I couldn't find the words that I wanted in the dictionary. I was also a little bit lost in the grammar reference.

I: Do you have any other comments that you would like to add?

C3: I enjoyed doing the exercises.

content presentation, information displays, special features such as illustrations and colour, and computer suitability of the materials.

The first feature examined was feedback. The candidates suggested that the colour-coded feedback for correct and incorrect answers offered by the ELMO system was sufficient except for the Compréhension du Texte activity. Two of the three candidates suggested that the colour-coded feedback and the display of the paragraph in which the answer is found did not offer sufficient information as to why their answer was wrong.

A change to include corrective feedback for each multiple choice option would be relatively easy to include both from a technical and authoring point of view. However, this issue should probably be tested with the target population before any final decisions are made.

Another instructional design decision which should be "flagged" for future study is the use of a "hint" option for the Lacunaire activity. One of the candidates suggested that more learning guidance could be offered by including a hint option to identify the part of speech e.g. noun, verb, etc., required in each blank space. This suggestion however, was not universally accepted. The two other candidates pointed out that this would require

students to know the names of the different parts of speech that most students are not familiar with.

Again it is recommended that this feature be evaluated with the target population. Unless there is strong positive reaction, it should not be implemented as it contradicts the current theories in second language teaching which focus on the functional use of language as opposed to the grammar elements of the language (Wilkins, 1979).

With respect to content presentation, there was strong agreement that the information was organized and treated in a fashion which would help to promote learning. The schematic presentation of information within the Expressions utility was especially praised. Remarks included "the layout makes it easy to see the contrast between the French and English forms" and "I like the presentation because there aren't a whole bunch of words to read but you can understand the ideas. It's real easy to understand."

Reaction to the information displays produced varied opinions. While all agreed that the functional areas of the screen were easy to distinguish, two of the candidates felt that there was too much information on the screens. This gave the appearance of a crowded effect especially in Lecture Active. To remedy this problem it was suggested that after selecting the skill area, the

activity menu options should overwrite the horizontal skill area menu options. There was, however, disagreement from the third candidate who liked the omnipresent reminder of the highlighted selected skill area. Again this issue should be resolved by experimentation with the target user.

Some universally agreed to comments included suggestions to: a) redesign the crowded screens in the Réference Grammaticale utility; b) make the "Conjugaison" option in the dictionary definition screen more obvious, and c) spread out the command line options to give a more symmetrical appearance to the screens.

Other areas of consensus involved colour choices and illustrations. The white text on blue background screen colours were considered to be good choices making the text readable and not too fatiguing to read. The green and red colour selection for correct and incorrect answers in the feedback also received positive comments. However, the black on magenta background for multiple choice option choice letters was not considered to be a good choice. The magenta was too difficult to distinguish from the red if an incorrect answer was shown.

The most negative reactions occurred with respect to the illustrations. The availability of illustrations was treated with much enthusiasm. However, there was disappointment in the quality of the lettering on the

maps. The problem is that the illustrations are displayed in low resolution mode. An investigation of different display technologies should be made before any recommendations are made.

For the other screen design problems, it is suggested that obvious problems with which all candidates concurred can easily be modified. Those areas which presented a difference of opinion should be flagged to be tested with the actual users rather than relying on reviewer opinion.

The computer suitability of the material

Although part of the instructional design component, the suitability of the materials is a key issue to the effectiveness of the computer materials. It is therefore discussed under a separate heading.

Materials that encourage active rather than passive learning and take advantage of computer capabilities are considered to be appropriate for the computer.

There was strong consensus that the overall design of the materials effectively promoted learning by encouraging users to take a more active than passive role with the activities.

In terms of effective use of the computer capabilities, again there was a positive reaction from the users. The "hypertext" and text manipulation were the

features most often cited as taking advantage of the computer's potential.

One of the candidates familiar with CAI courses proposed that some sort of branching could be included to accommodate different ability of learners. A compromise solution to this problem while still maintaining the integrity of the instructional design would involve creating four levels of exercise difficulty from easy to complex. Since the ELMO system already handles up to four exercises for each activity, this might be the most expedient solution.

Technical Reliability

Technical reliability refers to whether or not the program is reliable under normal use, i.e. no system crashes occur and the system behaves as it is supposed to. During Phase 3 of the evaluation, no system crashes occurred and the system responded appropriately and with the correct information to each command.

Ease of Use and Ease of Learning

According to R. Jones (1985), ease of use and ease of learning are the two most important qualities from the learner's point of view. He has listed eight principles which he suggests are fundamental to good interface design. The "ease of use" and "ease of learning"

qualities of the ELMO system have been evaluated in terms of these principles and include the following characteristics: transparency, consistency and predictability, familiarity, orientation, simplicity, control, cognitive supports, and psycho-motor supports.

Transparency refers to an interface which is always present but which does not obscure the user's view of the task. It must be invisible while the user is attending to the lesson but readily available when its functions are needed. Two areas which fit this description involve accessing the ELMO utilities and exiting a program operation.

In ELMO, the three most vital utilities are the Help feature, the Dictionnaire, and the Réference Grammaticale. The user has access to these utilities by pressing a function key whenever needed. The user can also exit from any program operation (hierarchies and modes) by pressing the <Esc> key. The candidates all reported satisfaction with this aspect of ELMO.

Consistency and predictability are also important features of an easy to use and learn system. An interface that is consistent always operates in the same manner and once its features are learned, the operation becomes automatic. Within the ELMO system, there were three inconstant areas which proved frustrating to the candidates.

First, to exit from a hierarchy or mode, the user always presses the <Esc> key except to exit from the skill area menu where the "Sortie" option must be selected. Originally, the aim of this design was to prevent a user from unintentionally leaving the ELMO system. To keep the operation consistent, a possible solution involves continuing to use the <Esc> key at the skill menu level but before the command is executed, the user should be required to confirm that s/he wants to exit.

The second consistency problem concerns the procedure for using the Dictionnaire which is different from the other utilities in Lecture Active. The Dictionnaire is invoked through a function key and not through a selectable option as are the other utilities. Furthermore, expressions related to all utilities except the Dictionnaire are highlighted and available for selection once the utility is invoked.

The first difficulty can be resolved by having the Dictionnaire utility represented as a selectable option instead of as a function key. The solution to the second issue is to highlight expressions associated with the Dictionnaire in the same way as for the other utilities. Initially, this was not done because the Dictionnaire would grow as each new module was developed and it would therefore be impossible to highlight all existing words

from the dictionary found in the text. However, logic dictates that consistency is the best route to follow in this case and that the Dictionnaire utility should conform to the same functionality as the other utilities.

The third problem with consistency is closely associated with the preceding problem and involves the different methods of accessing both the Dictionnaire and Réferences Grammaire. These utilities can be accessed directly in Lecture Active or indirectly in all the other activities. Both the direct and indirect modes are invoked through function keys either alone or in combination with the Ctrl key (e.g. the direct and indirect mode of the Dictionnaire are accessed by <F4> and Ctrl <F4> respectively. The problem is essentially one of remembering which mode requires the function key either alone or with the Ctrl key. Again the easiest solution is to represent both the utilities which use the direct method of access as selectable options in Lecture Active. Not only does this resolution differentiate the two modes; it provides support for short-term memory and makes the utilities within Lecture Active all consistent and thus predictable.

Familiarity is the third principle underlying a good user-computer interface. An interface that is familiar builds on the user's previous knowledge and skills both with computers and with other media.

One of the major operating errors with respect to the ELMO system is the use of the <F1> key to make selections instead of the more familiar <Enter> key. When assigning alternative keyboard keys to the mouse (in case of mouse breakdown), it was decided to represent the Select, Help, and Activate functions as the tri-grouping <F1>, <F2>, and <F3>. However, it became obvious after watching the users on the system that they were more used to and comfortable with the <Enter> key for making selections. Technically, it is very easy to change the selection key to the <Enter> key.

Strangely enough, familiarity did not play a role in having the activity directions in the Help utility instead of contained within the activity as is traditionally done in computer exercises. Candidates did not seem to think it a problem.

Orientation is another important factor in the user-computer interface design. Orientation in the interface suggests stabilizing and positioning the user (Gaides, 1983) i.e. it keeps the user informed of where they are, where they are going, and how to get somewhere else. ELMO uses orienting indicators such as omnipresent highlighted options to indicate skill, activity, and command options that have been selected as well as titles for module name and exercise number on each screen. The candidates

reported that orientation in these areas was not a problem.

There was, however, some confusion initially as to the processes and transitions occurring on the auxiliary screen. Specifically, users seemed disoriented in terms of how to exit from the auxiliary screen and were unconscious of the existence of more than one screen despite both the "Sortie: <ESC>" and "Page number/Total Page" indicators. To remedy these problems, some form of text attribute or symbol should be used to help the user discriminate these screen messages. For example, a highlighted arrow " ----> " could be used to indicate to the user that they should page forward on screens where there are additional page(s).

Another area of confusion involved mode status once a utility in Lecture Active was accessed. Once a command is invoked, this action should have some form of visible response. For example, when a utility is selected, expressions associated with the utility are highlighted. However, a problem occurs if the student happens to be on a screen with no associated highlighted expressions. An earlier resolution after discovery of this problem was to display a message to reassure the user that the utility was indeed active. Despite this message, all three of the candidates assumed that something was wrong when no apparent response was given once the utility was

selected. A reasonable solution would be to warn students about this problem in both the Help facility and the student manual.

Simplicity is a very important aspect to the ease of use and ease of learning areas. Since the ELMO system is both comprehensive and contains many on-line resources, a degree of complexity will exist beyond a system consisting of a single lesson. However, the system becomes much easier to use with practice.

As users became more familiar with the mechanics of the system, they moved from hesitation at initiating commands to a high degree of confidence. Generally, computer operation did not interfere with concentration on an activity except at the very initial stages when the user was unfamiliar with the system.

However, one area which caused some frustration was with the direct method access of the Dictionnaire in Lecture Active. To look up a word in the Dictionnaire, the user must select the Dictionnaire utility and then a word from the text. The problem is that lexical entries do not occur in the Dictionnaire in the same form as in the text and so a match seldom occurs. In the questionnaire, it was specifically noted as a weakness in the ELMO system. A simple solution is to highlight words in the text that are contained in the Dictionnaire. The computer will not have to do a match up and instead can

link the word directly to the definition screen of the lexical entry. This was also an earlier solution to making the Dictionnaire more consistent with other utilities.

Some confusion would also be eliminated by presenting an "error message" rather than a beep when an unauthorized operation has been selected.

With respect to the area of learner control, a good user interface permits maximum student control of the interaction. As expected, there was quite a positive reaction to the issue of learner control since most operations, except for returning to and repeating a multiple choice item, are available in the ELMO system.

Cognitive supports refer to any device that aids the cognitive processes used in learning. For example, to overcome the limitations of short-term memory, available options should be visible. In ELMO, a template identifying the Dictionnaire, Réference Grammaticale, and Help function keys seemed sufficient cognitive supports to the candidates.

The final principle in good interface design concerns psycho-motor supports such as input devices. For example, since typing could be a difficult task for a student, an interface that uses a mouse will consume less time and result in fewer errors. In ELMO however, cursor manipulation with the mouse, especially to select

multiple choice items, is a difficult operation. This is due to the sensitivity of the mouse.

Slowing the mouse down is not an appropriate solution as this would also slow down the display of the text. A possible solution involves restricting the area in which the cursor can move. At present, the cursor can be manipulated anywhere on the screen. By restricting cursor movement to option letter choices, it is easier to make a selection.

Program strengths and weaknesses

Findings relating to the program concept were directed at determining whether the ELMO system was perceived as worthwhile and if so, what general areas needed improvement. All three candidates expressed enthusiasm for the product. One of the candidates liked the game-like quality of activities such as the Lacunaire and Reconstruction and the availability of an on-line Dictionnaire. Another liked the text manipulation ability and a third candidate thought that the comprehensiveness of the system was its best quality. All of the candidates agreed that the activities were both suitable for the computer and helpful in reading comprehension. None of the candidates reported that any features (other than those already mentioned) made ELMO difficult to operate nor did they identify any tools or utilities that were

lacking or that would make interacting with the exercises easier. The negative comments included problems already reported concerning Dictionnaire use, system response time, and the number of different operations required to use the system. However, the candidate that was concerned about the complexity of the system also noted that with practice, the system would become much easier to operate.

Chapter 7

CONCLUSIONS

7.1 Introduction

This study was concerned with the formative evaluation of a second language reading program (ELMO) on the computer. The evaluation included three different review phases with different reviewers during each phase. Changes to the ELMO system based on the first two phases of the evaluation have already been implemented. Further modifications to the system will be determined by the phase 3 evaluation.

As discussed in the introduction, because the target population was not available for testing, only the instructional and technical aspects of the design were examined during phase 3. In addition, because of the small sample, this thesis equivalent does not address the effectiveness of the product. However, as an interesting by-product of this project, several suggestions for improving the formative evaluation process have been made.

7.2 Outcomes of the Phase 3 Formative Evaluation

The formative evaluation of the ELMO project was conducted to determine the extent to which the following criteria have been met:

1. The program has a sound instructional design

influenced by theoretical and practical knowledge of how people learn.

2. The instruction is suited to a computer presentation. The computer presents the learning materials more effectively than any other means of instruction.

3. The software is technically reliable under normal conditions of use.

4. The software is easy to use for individuals with a minimum of computer expertise.

In general, reaction to the ELMO system was quite positive with mostly minor changes suggested. The question then becomes which of the changes should be implemented on the basis of which criteria.

The basis for determining acceptable evidence is a nebulous area as people have varying opinions on what constitutes acceptable evidence to warrant changes (Gooler, 1980).

For this study, it is recommended that no major changes be implemented unless there is some compelling logic to do so, such as the conventions of machine use. The final phase of the evaluation was conducted using only three candidates. This is an insufficient number to warrant concrete evidence of change. In addition, it is anticipated that further changes will be made after field testing with the target population. In terms of cost-effectiveness, it is more efficient to make all changes to the software at one time rather than making repeated changes.

I. **Adequacy of the instructional design**

With respect to the instructional design aspect of the system, there was a very positive response from the candidates. Recommended changes were minor in nature and would not have any major impact on the system.

In general, reaction to feedback and hints, the content presentation, information displays, special features such as colour was positive with relatively few changes recommended.

In terms of modifications to the system, one of the changes that should be immediately investigated is the use of the different display technologies for the illustrations. In addition, for screen design problems such as crowding and spacing, it is suggested that obvious problems with which all candidates concurred be modified. Those areas which presented a difference of opinion should be flagged to be tested with the actual users rather than relying on reviewer opinion.

Changes to include additional feedback to the Compréhénsion du Texte and the inclusion of a hint option in the Lacunaire activity should not be implemented until the activities are tested with the target population.

II. **The computer suitability of the material**

The most positive reaction to the instructional design element of the ELMO system was with respect to the

computer suitability of the material. The nature of the ELMO system as a diagnostic tool requires an interactive question and answer type of format. Each exercise requires the student to actively manipulate the content rather than simply reviewing facts during an exercise. The ELMO system ranked very highly in this respect.

The only suggestion for improvement was to have some form of adaptive branching. The best solution would be to have four levels of exercises within each activity.

III. Technical Reliability

During the Phase 3 evaluation, the ELMO system was running reliably and none of the candidates experienced any operating "bugs".

Although not a reliability issue, slowness of the system in responding to user commands is a technical characteristic of the system. System response time was one area that proved frustrating for all of the candidates. Speeding up the system could either require a complete reimplementation or new hardware which is not a cost-effective solution and neither of these would guarantee success.

IV. Ease of Use and Ease of Learning

ELMO, by its very comprehensiveness, is a complex system and requires some practice before a user can

become familiar with all of its options and operations. In general, the candidates seemed to adapt quickly to its use although there are certain areas which should be modified to make the system easier to use. These include making both the access and use of the Dictionnaire and Référence Grammaticale identical to the other utilities within Lecture Active; exclusive use of the <Esc> key to exit from a hierarchy or mode; using the <Enter> key instead of the <F1> key to make selections; more explicit means of making the user aware of the Sortie option and Page number indicators on the auxiliary screen; the use of error messages instead of beeps during unauthorized operations; and better control over mouse movement.

7.3 Suggestments for Improving the Formative Evaluation Process

The formative evaluation procedures for this project were dictated by the contractual agreement with the client. This resulted in a compromise between ideal formative evaluation practices and feasibility. Changes from more traditional formative evalution practices included the number of trials during each phase, the numbers and types of candidates/reviewers, and the location of the product testing. Although the pedagogical content was not evaluated for this study, it was part of the Phase 1 and 2 evaluations.

During Phase 1 of the evaluation, the instructional

and technical design documents were reviewed by a single evaluator. During Phase 1, it is important to identify as many problems as possible at this earely stage in the product's development. Although the reviewer had the necessary qualifications to examine the instructional and technical designs, additional reviewers could have offered additional insight and provided more suggestions as to potential problem areas.

The second phase of the evaluation involves testing the on-line product in order to debug the program and correct any problems. During this phase, it is recommended that the program be tried out with a small group of potential users in order to get both reliable and valid information. The number of tryouts depends on the complexity of the program and number of bugs that are found.

During the ELMO Phase 2 evaluation, it was not possible to use members of the target group and and only one tryout was possible. This poses a dilemma in terms of degree of confidence in the identified problems and their required modifications.

It is imperative early in the development of the project to curtail modifications unless there is a compelling reason for change since redesign efforts impede any further progress being made. Major modifications, after the design has been implemented, are

very expensive in terms of both time and capital. It is crucial, therefore, that both the contractor and the client have a high degree of confidence in the design. To achieve this assurance, it is recommended that another stage not traditionally found in the formative evaluation be implemented.

Kearsely (1983) recommends developing a prototype exemplary of the full-scale effort with the intent of creating a concrete representation of the specifications and trying it out in a pilot test or field test before proceeding with further development.

With the diversity of activities in the ELMO system however, the time and effort used to program a prototype system using ELMO tools would be almost as much as a full-scale effort. Alternatively, a program for creating interactive slides such as Dan Bricklin's Demo could be used to produce the prototype both quickly and efficiently. It is imperative that the prototype be interactive no matter what program is used to create it.

There are several advantages associated with creating a dynamic mock-up. First of all, potential design flaws can be detected and corrected at an earlier stage. Early changes are always much easier to implement than at a later stage where changes have a more wide-ranging affect on the system. Secondly, a dynamic display offers the reviewers a better understanding of how the

system works during a hands-on operation as opposed to reading a description. Whereas there may be misunderstandings associated with reading a design document, seeing a mock-up working is not ambiguous. Thirdly, and most importantly, it allows potential end-users to test the software and provide an indication of which aspects contribute to or detract from the effectiveness of the preliminary design.

Using a dynamic, mock-up would perhaps be time consuming but in the end probably more cost-effective than making design changes to the system once it's on-line. Also provide more confidence in the product accomplishing its objectives.

Finally, the ELMO Phase 3 evaluation for this project was very rudimentary. Ideally, the Phase 3 evaluation should use a statistically significant sample number and candidates should be members of the target audience in order to have both valid and reliable data. In addition the Phase 3 evaluation would test not only the instructional and technical designs but the effectiveness of the product as well.

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APPENDIX A

ACTIVITY DESCRIPTIONS AND SAMPLE SCREENS

LECTURE ACTIVE

The first activity, Lecture Active, consists of a reading passage of approximately 1000 words. Before encountering the text, students are presented with 7 open-ended questions designed to direct attention to the relevant sections of the discourse, help organize the input, and build expectancies for the type of information that will be encountered in the text. Students are not required to answer these questions; they serve as an advance organizer. Although these questions do not require answers, students are advised in the help facility to seek the answers to the questions as they are reading the text. The text passage is presented on the primary screen when <ESC> is pressed to exit the auxiliary screen.

The reading passage examines the interrelation of the air, sea and ground forces of Great Britain and of Argentina during the war in the Falklands. It compares the British and Argentinean co-ordination of air, sea and land forces, which in turn facilitated the deployment of troops, equipment and supplies. This theme was selected as it embodies all branches of the military and therefore would have a general appeal to the target population.

Students are provided with the technical terminology pertinent to the subject matter and to military operations in general through the on-line dictionary

facility.

To facilitate text comprehension, readers have access to several categories of information which address comprenension difficulty. Through highlighted key phrases (hypertext), readers can request grammatical explantions, supplemental background information, illustrations, and contextual explanations of interference structures.

The following utilities are available to help students decode the semantic and syntactic elements of the text.

1. Grammar Reference

All the past tense expressions in the text are highlighted when the student selects the grammar utility. The grammar reference provides a brief explanation of the target grammar point, illustrates the different forms and use of the verb tense, and provides simple examples in both English and French. Students can also select a fill-in-the-blank ad hoc exercise to practice the particular grammar point under consideration.

2. Dictionary

The dictionary contains key-words necessary for the comprehension of the text document as well as the other activities in the reading skills area. It provides the English translation of the target word and includes both a French and English contextual example. The conjugation of verb forms is also provided.

3. Commentary

The Commentary utility expands upon key concepts within the text to provide background information or a more detailed explanation of a concept.

4. Expressions

The Expressions utility is used to furnish semantic and contextual explanations not found in either the dictionary or the grammar reference.

5. Illustrations

Illustrations include photographs (e.g. aircraft types, weaponry, land vehicles) and schematic diagrams (e.g. maps).

GUIDE à LA LECTURE DU TEXTE

1. Pourquoi est-il important de résoudre les problèmes de logistique, de stratégie et de ta tique dans la guerre?

2. Qu'est-ce qui peut influencer le résultat ultime d'un conflit?

3. Quelle faiblesse pouvait-on discerner chez les Argentins?

4. Qu'a fait la Grande-Bretagne pour dominer le conflit des Malouines?

5. Vers la fin de la guerre, pourquoi était-il évident que les Argentins n'allaient pas remporter la victoire?

6. Comment l'hélicoptère a-t-il aidé la coordination des opérations combinées des Britanniques?

7. En fin de compte, pourquoi les Argentins ont-ils perdu la guerre des îles Malouines?

Sortie: <ESC> Page 1 / 1

Fig 4 Lecture Active Exercise from Compréhension de L'Écrit Option: Auxiliary Screen

COMP DE L'ÉCRIT	MAÎT DE L'ÉCRIT	COMP DE L'ORAL	MAÎT DU DISCOURS	SORTIE
LECTURE ACTIVE	IDÉE PRINCIPALE	LACUNAIRE	RECONSTRUCTION	COMP DU TEXTE

Module 1 La Guerre des îles Malouines Exercice 1

Le maréchal Archibald Wavell, commandant en chef des forces britanniques au Moyen-Orient de 1939 à 1941, a démontré l'importance capitale de la logistique; de la stratégie et de la tactique dans le domaine militaire. Pour Wavell, le succès des opérations dépend surtout de la logistique:

> Plus je vois la guerre, plus je me rends compte que tout en elle dépend de l'administration et du transport. On a besoin de peu de talent ou d'imagination pour voir en quel lieu et à quel moment on voudrait déployer ses forces; cela requiert une excellente connaissance et un travail ardu pour savoir où l'on peut situer ses forces et comment les y maintenir.

Commentaires	Expressions	Illustrations	
			Page 1 /9

Fig 5 Lecture Active Exercise from Compréhension de L'Écrit Option: Primary Screen

Supériorité numérique

Avantage aérien très net de l'Argentine du point de vue quantitatif:

. 120 Mirage, Skyhawk, Super-Etendard, et Canberra
. des hélicoptères
. des Pucará légers pour l'attaque au sol

Du côté britannique:

. 22 Sea Harrier
. 10 Royal Air Force Harrier GR3
. 140 hélicoptères Sea King et Wessex
. Aucun avion de chasse à grand rayon d'action

Sortie: <ESC> Page 1/1

Fig 6 Example of Commentaire explanation shown on auxiliary screen

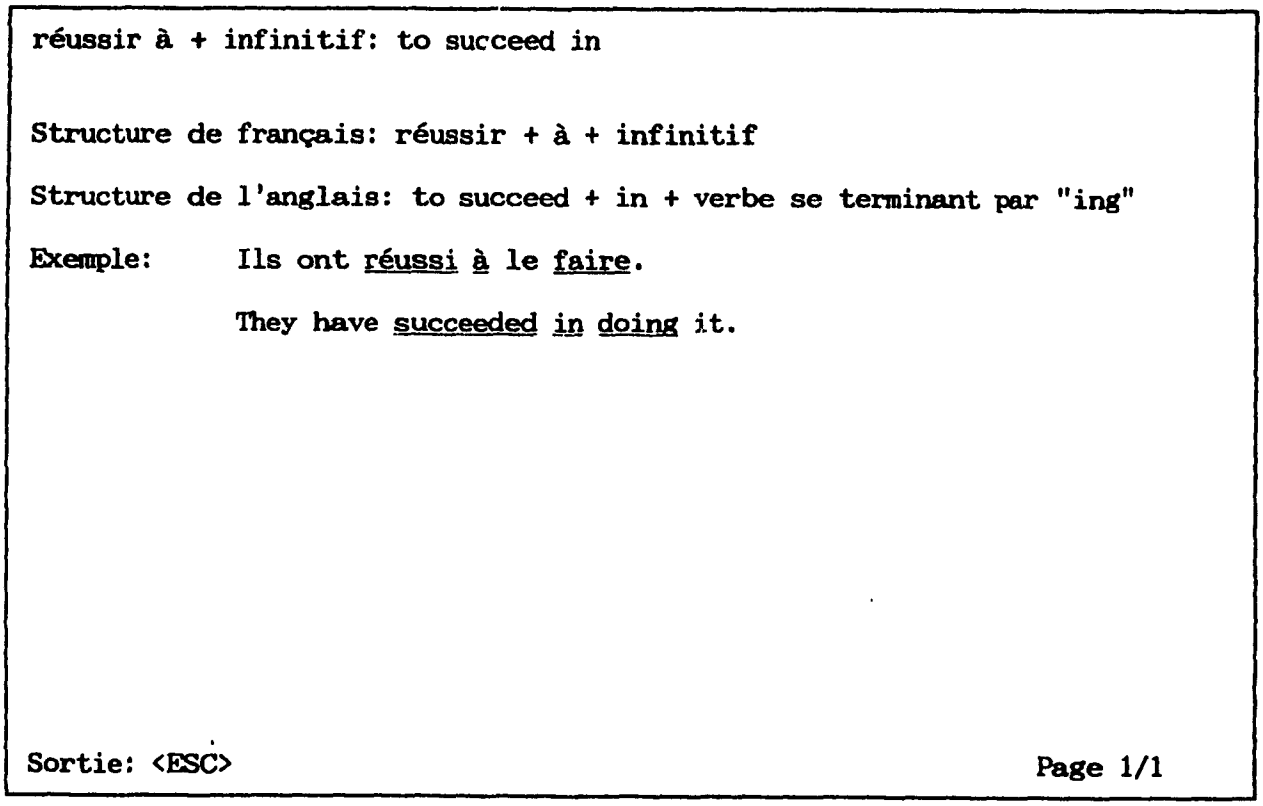

Fig 7 Example of Expressions explanation shown on auxiliary screen

DICTIONNAIRE

to shoot down

Les canons anti-aériens ont abattu les avions ennemis.
The anti-aircraft guns shot down the enemy aircraft.

abattre (v)

conjugaison
Sortie: <ESC>

Page 1/1

Fig 8 Example from the on-line Dictionnaire definition screen

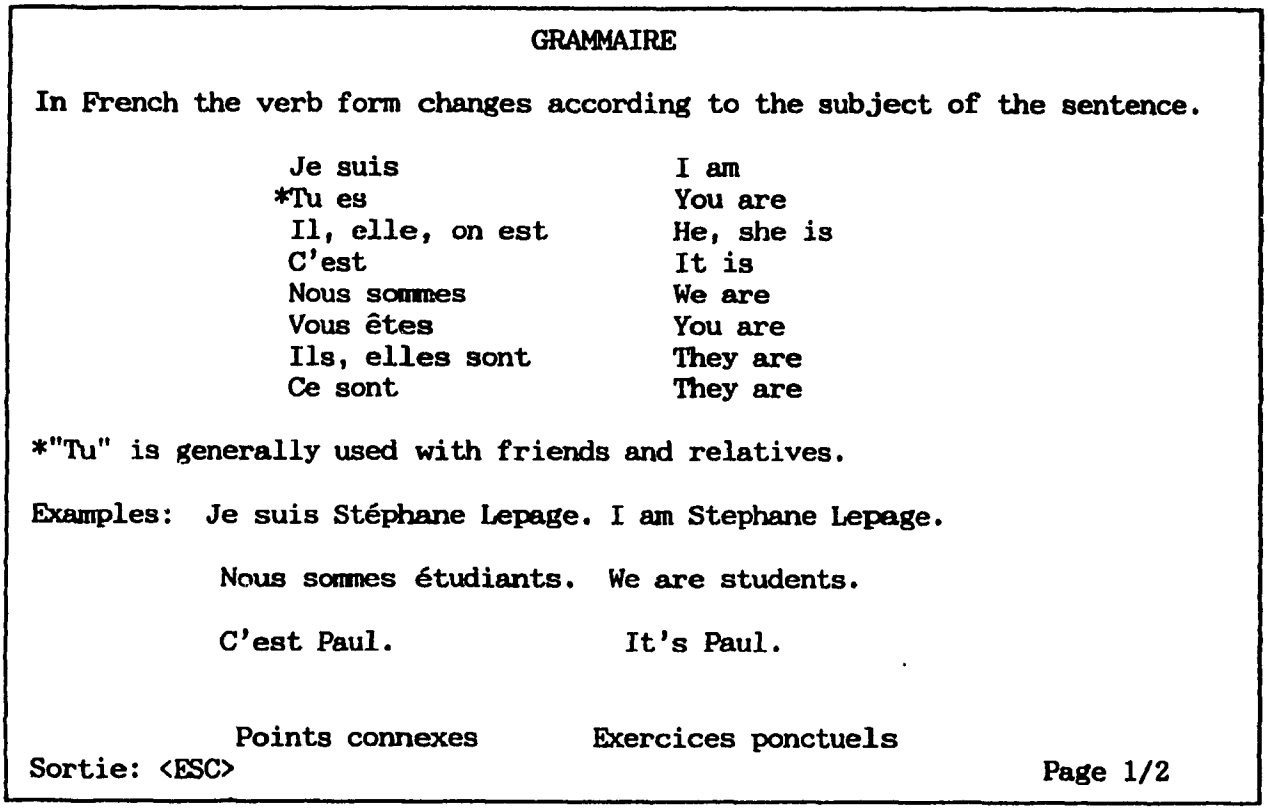

Fig 9 Example from the Réference Grammaire explanation screen

IDÉE PRINCIPALE

Idée Principale is the next activity in the reading area. The goal of this activity is to help the student discriminate between key and support ideas in the reading text.

Students are given several paragraphs taken from the main reading text and for each paragraph, three options statements on the main idea of the paragraph are presented. Students must identify the one statement that represents the main idea of the paragraph.

The option statements are based on the concepts within the paragraph. Two criteria are used to determine the main idea of a paragraph: The amount of space a particular idea takes and the degree of generality or particularity of an idea.

The first criteria is based on the number of lines of specific information an idea occupies in the paragraph. The second criteria identifies the topic or main idea of a paragraph as being general with many supporting points or details.

A hint option can be accessed to identify which criteria is used for the main idea of a particular paragraph. After each interaction, students receive corrective feedback.

COMP DE L'ÉCRIT	MAÎT DE L'ÉCRIT	COMP DE L'ORAL	MAÎT DU DISCOURS	SORTIE
LECTURE ACTIVE	IDÉE PRINCIPALE	LACUNAIRE	RECONSTRUCTION	COMP DU TEXTE

Module 1 La Guerre des îles Malouines Exercice 1

1. L'idée principale du paragraphe est:

A. qu'au début du conflit, les Argentins, ayant déclenché les hostilités, semblaient jouir d'un certain avantage stratégique qui s'avéra en fait superficiel.

B. qu'au début de la guerre des îles Malouines, les Britanniques n'ont pu réagir immédiatement à l'invasion des Argentins.

C. que les Argentins ont établi une ligne de ravitaillement entre leur garnison sur les îles Malouines et le continent.

FEEDBACK AREA

Indice	Solution	Suivant	Aux
Sel 10	Résultats 0/0		Page 1 /3

Fig 10 Idée Principale Exercise from Compréhension de L'Écrit Option: Primary screen

Au début de la guerre des Malouines, le principal avantage des Argentins résidait dans le fait qu'ils avaient agi les premiers. Ils avaient envahi les îles Malouines et ils s'étaient retranchés avant que les Britanniques n'aient pu réagir à leur initiative. Ayant établi une garnison sur les îles et renforcé leurs positions, les forces argentines bénéficiaient à priori de conditions géographiques favorables, étant donné que cette garnison pouvait être ravitaillée à partir des bases aériennes et des ports situés sur le continent. Ce n'était toutefois qu'un avantage apparent. Les îles Malouines se trouvent à quatre cent milles du continent sud-américain. Par conséquent l'aviation argentine

Sortie: <ESC> **Page 1/9**

Fig 11 Idée Principale Exercise from Compréhension de L'Écrit Option: Auxiliary Screen.

LACUNAIRE

The goal of the Lacunaire is to sensitize the student t · the grammatical, semantic, and rhetorical features of the French language at a micro level.

Students are given a reading passage of approximately 50 words based on the main reading passage with 19 lexical elements deleted. The lexical elements are both single and multi-word expressions either derived from the original passage or lexical or stylistic variations of words from the text. These expressions are presented in a pick-list area along the right-hand side of the screen. Students must match the lexical items with the appropriate blanks. In so doing, it is be necessary to understand the key ideas and word relationships within the text.

Some vocabulary used in this activity was derived from the original passage; the rest are lexical or stylistic variants.

A random sampling of lexical and grammatical items (e.g. nouns, verbs, adjectives, relational connectors) were deleted from the passage but the concentration of word deletions were based on the past tense.

COMP DE L'ÉCRIT	MAÎT DE L'ÉCRIT	COMP DE L'ORAL	MAÎT DU DISCOURS	SORTIE
LECTURE ACTIVE	IDÉE PRINCIPALE	LACUNAIRE	RECONSTRUCTION	COMP DU TEXTE

Module 1 La Guerre des îles Malouines Exercice 1

Dans _____ guerre, le succès des opérations militaires _____ la solution _____ problèmes de logistique. _____ que les commandants militaires _____ bien les déploiements de leurs troupes _____ le transport de leur matériel. Les Britanniques _____ _____ sur les Argentins _____ la guerre des îles Malouines _____ l'aviation argentine. En effet, _____ la plupart

dépend de
il faut
pendant
ainsi que
empêcha
le manque de
ainsi
chez
à la fin de
coordonnent
l'emportèrent
en décimant
la perte de
toute
aux

Feedback	Solution	
Sel 19	Résultats 0/0	Page 1 /3

Fig 12 Lacunaire Activity from Compréhension de L'Écrit
Option: Primary Screen

RECONSTRUCTION

The goal of the Reconstruction activity is to sensitize students to the coherent and cohesive elements of discourse at a macro level. The exercise consists of a several sentence segments presented in a jumbled order. The student's task is to reconstruct the sentence segments so that they flow in a logical order.

The sentence segments are based on the main reading passage and utilize the grammar points of the module i.e. past tense and expressions of time. Sentence order is proved through key words, morphosyntactic cues such as logical connectors (e.g. Firstly, Secondly, etc.) and non-linguistic cues (e.g. punctuation)

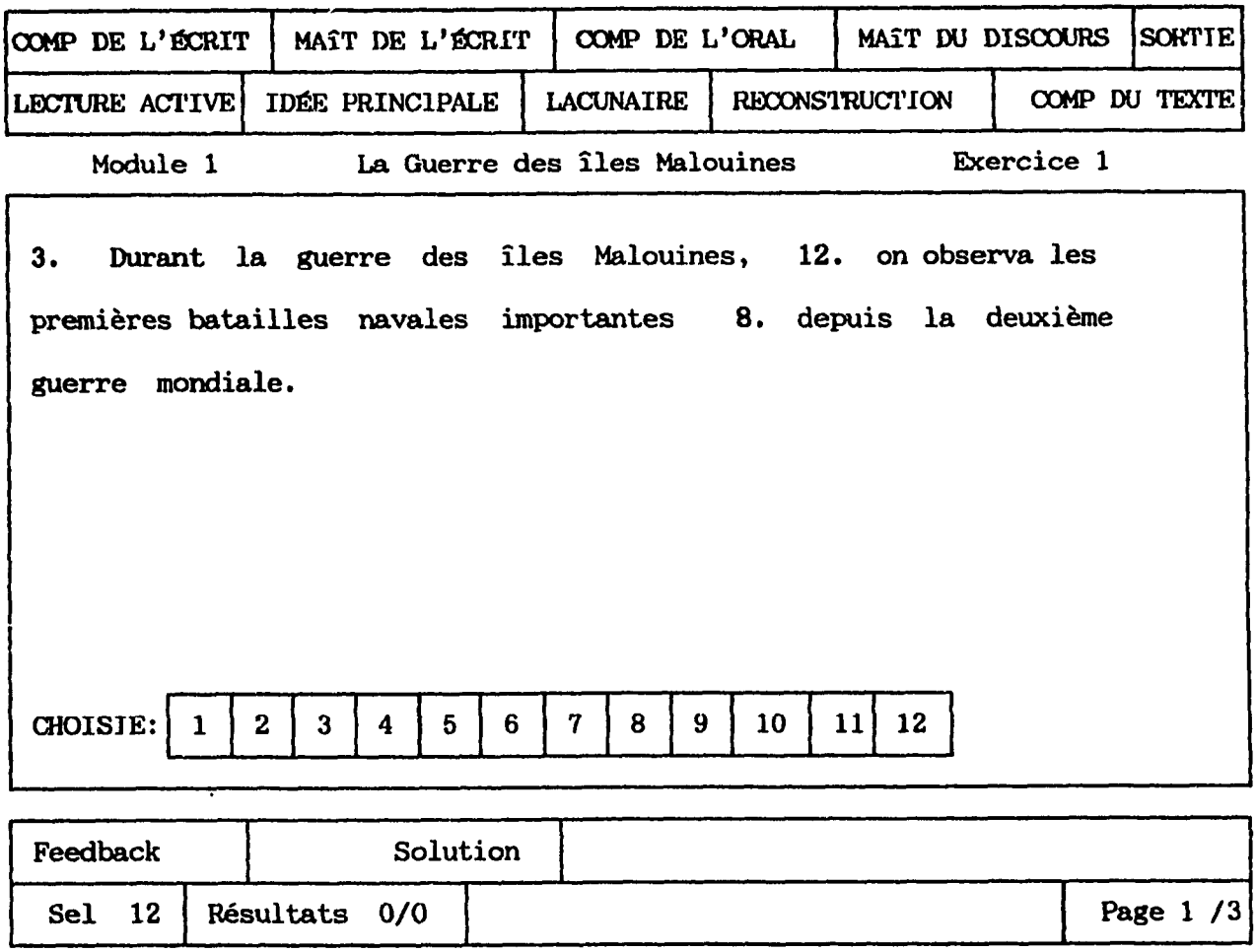

Fig 13 Reconstruction Exercise from Compréhension de L'Écrit Option: Primary Screen

1. dans son ensemble, elle n'était pas aussi importante
2. le groupe opérationnel que la Grande-Bretagne envoya aux Malouines
3. Durant la guerre des îles Malouines,
4. comprenait cinquante et un navires de guerre;
5. que le groupe opérationnel britannique;
6. D'une part, il y avait la marine britannique:
7. cinquante-quatre navires civils pour service militaire.
8. depuis la deuxième guerre mondiale.
9. de plus, elle comprenait des bâtiments de guerre anciens
10. le gouvernement britannique réquisitionna aussi
11. D'autre part, il y avait la marine argentine:
12. on observa les premières batailles navales importantes

Sortie: <ESC> **Page 1/1**

Fig 14 Reconstruction Exercise from Compréhension de L'Écrit Option: Auxiliary Screen

COMPRÉHENSION DU TEXTE

The Compréhension du texte is the final activity in the compréhension de l'écrit area. This activity consists of 10-20 multiple choice questions on the comprehension of the main reading document. The questions cover areas such as factual information, drawing conclusions, making inferences, cause and effect, literal and figurative usage of language elements, referents, synonyms, antonyms, and coherence and cohesion elements.

COMP DE L'ÉCRIT	MAÎT DE L'ÉCRIT	COMP DE L'ORAL	MAÎT DU DISCOURS	SORTIE
LECTURE ACTIVE	IDÉE PRINCIPALE	LACUNAIRE	RECONSTRUCTION	COMP DU TEXTE

Module 1 La Guerre des îles Malouines Exercice 1

1. De quel avantage jouissaient les Argentins au début de la guerre?

   A. Ils avaient pris position sur les îles alors que les Britanniques étaient dans l'incapacité de riposter immédiatement.

   B. Ils avaient envahi les îles Malouines et empêchaient les Britanniques de s'approcher.

   C. Ils avaient pris comme otages les habitants des îles Malouines et éliminé tous les défenseurs britanniques.

	Solution	Suivant	Aux
Sel 20	Résultats 0/0		Page 1 /20

Fig 15 Comp du Texte Exercise from Compréhension de L'Écrit Option: Primary Screen

Au début de la guerre des Malouines, le principal avantage des Argentins résidait dans le fait qu'ils avaient agi les premiers. Ils avaient envahi les îles Malouines et ils s'étaient retranchés avant que les Britanniques n'aient pu réagir à leur initiative. Ayant établi une garnison sur les îles et rénforcé leurs positions, les forces argentines bénéficiaient à priori de conditions géographiques favorables, étant donné que cette garnison pouvait être ravitaillée à partir des bases aériennes et des ports situés sur le continent. Ce n'était toutefois qu'un avantage apparent. Les îles Malouines se trouvent à quatre cent milles du continent sud-américain. Par conséquent l'aviation argentine devait agir dans les limites du rayon d'action de ses unités, alors qu'une ligne de ravitaillement devait

Sortie: <ESC> Page 2/8

Fig 16 Comp du Texte Exercise from Compréhension de L'Écrit Option: Auxiliary Screen

CONCORDIA UNIVERSITY
Division of Graduate Studies

This is to certify that the thesis prepared

By: Jacqueline Werner

Entitled: Production and Evaluation of a Computer-Assisted Second Language Reading Programme

and submitted in partial fulfillment of the requirements for the degree of

Master of Arts

complies with the regulations of this University and meets the accepted standards with respect to originality and quality.

Signed by the final examining committee:

_____ Chair

_____

_____

_____

_____ Supervisor

Approved by _____
Chair of department of Graduate
Program Director

March 29, 1989 _____
Dean of Faculty

APPENDIX B

PRETEST

LES HELICOPTERES DANS LA GUERRE DES ILES MALOUINES

Tout au long du conflit des îles Malouines, les hélicoptères, de part et d'autre, jouèrent un rôle primordial pour finalement assurer la victoire aux troupes britanniques. En effet, le déploiement de troupes sur les îles était extrêmement difficile, en raison du climat inhospitalier, du relief accidenté et du manque de routes carrossables. En conséquence, l'hélicoptère restait le meilleur moyen de transport tant pour les troupes que pour le matériel.

Afin de soutenir sa garnison, l'armée argentine amena à pied d'oeuvre plus de 22 hélicoptères Chinook, Puma, Bell UH-1 et Agusta A109 pour le transport des troupes. Les défenseurs des îles comptaient énormément sur l'appui de ces hélicoptères pour lancer des contre-attaques au cas où les troupes anglaises reviendraient dans les îles. Les Britanniques firent appel à toutes leurs forces aériennes. C'est ainsi que sur les porte-avions "Hermes" et "Invincible" se trouvaient les escadrons d'hélicoptères de lutte anti-sous-marine 820 et 826 qui comptaient, chacun, neuf Sea King; le "Hermes" comptait également neuf hélicoptères de transport Sea King de l'escadron 846. Vers le 6 avril, l'armée britannique disposait de près de 54 hélicoptères de divers modèles, tels que les Sea King, Lynx, Wessex, Wasp et Scout. L'hélicoptère de transport pouvait lever

des charges suffisantes pour servir d'appui logistique efficace aux débarquements sur les îles.

L'Angleterre envoya trois nouveaux escadrons vers l'Atlantique Sud afin d'accroître le nombre d'hélicoptères de transport disponibles. Le premier escadron, le 825, comptait des Sea King et les deux autres, les escadrons 847 et 848, se composaient essentiellement de Wessex. Le 23 avril, l'Angleterre subit sa première perte lorsqu'un hélicoptère Sea King plongea dans l'océan.

Le 1er mai, lorsque l'Argentine lança une attaque de grande envergure, les hélicoptères jouèrent un rôle extrêmement important dans la protection des navires de guerre britanniques. Les Sea King maintenaient une ligne de défense ininterrompue contre les forces sous-marines ennemies, créant ainsi un écran de protection d'environ 7 à 12 milles devant la flotte britannique, tandis qu'un autre hélicoptère effectuait une tâche de dépistage de navires de surface dans un rayon de 200 milles. Les Sea King avaient aussi pour objectif de chercher le sous-marin argentin ultra-moderne, le "San Luis", qui, selon les informations les plus récentes, opérait dans les parages. Cette nuit-là, le "HMS Hermes" se rapprocha des îles Malouines pour permettre aux hélicoptères de transport Sea King de l'escadron 846 d'emmener des patrouilles de reconnaissance de l'escadron G des S.A.S.

à des points stratégiques d'où ils pourraient observer les mouvements des troupes argentines.

Le 4 mai, lorsque le destroyer "HMS Sheffield" fut frappé par un missile Exocet argentin et déclaré en perdition, les hélicoptères transportèrent des équipes de pompiers et du matériel pour combattre le feu. Pendant plus de quatre heures, une horde d'hélicoptères tenta de sauver le "HMS Sheffield", mais ce fut peine perdue. Le 9 mai, lorsqu'un remorqueur argentin fut détruit par des Sea Harrier anglais, les hélicoptères Sea King prirent possession du bateau.

Les 13 et 14 mai, deux hélicoptères Sea King de l'escadron 846 débarquèrent 45 hommes de l'escadron D des S.A.S. à l'île Pebble, où ils détruisirent un grand nombre d'appareils argentins. Le résultat de cette attaque porta un dur coup au moral des Argentins.

Le lendemain, avec l'arrivée d'Angleterre de l'"Atlantic Conveyor", ainsi que d'autres navires de ravitaillement et de troupes, un transfert important de quatre hélicoptères Lynx s'effectua entre les navires britanniques à l'est des
îles Malouines. Ces hélicoptères, équipés de matériel électronique spécialisé, se révélèrent d'un grand secours pour la défense des porte-avions.

Durant toute la durée du conflit, tous les hélicoptères restèrent en état d'alerte. L'une des

missions des hélicoptères Sea King fut de débarquer des équipes de S.A.S. près des bases aériennes argentines. Ces équipes de S.A.S. avaient pour objectif d'espionner les bases aériennes ennemies et de rapporter les faits par radio à leur base chaque fois que les avions argentins se préparaient à lancer une attaque.

Lors de l'attaque de San Carlos, les hélicoptères Sea King de l'escadron 826 prirent position au nord de Grantham Sound et effectuèrent un contrôle radar pour détecter d'éventuels sous-marins ennemis et permettre aux forces britanniques de débarquer en toute sécurité. Simultanément, des hélicoptères déposèrent à Goose Green une quarantaine de S.A.S. pour faire diversion. A partir de ce moment-là, les Britanniques se donnèrent comme priorité de détruire les hélicoptères argentins qui allaient immanquablement servir de vecteurs de troupes. Ainsi, trois hélicoptères Puma argentins furent détruits au sol, mais un hélicoptère Bell UH-1 s'échappa. Le manque de réaction de l'armée argentine au débarquement de San Carlos, selon le général Menéndez, était dû au nombre restreint d'hélicoptères à sa disposition. Cette opinion se trouve confirmée par la perte du tiers des hélicoptères argentins, spécialement de leur unique Chinook et de deux Puma, près de Mount Kent.

Le 23 mai fut désastreux pour les Argentins lorsque 4 hélicoptères, 3 Puma et 1 Agusta A109, furent

lourdement endommagés par des Sea Harrier en route vers la côte est des Malouines. En retour, le 25 mai fut un jour funeste pour les Britanniques eux-mêmes lorsque le destroyer "HMS Coventry" fut coulé. Une douzaine d'hélicoptères Sea King et Wessex survolèrent l épave pour secourir les rescapés. Il en fut de même lors de l'attaque contre l'"Atlantic Conveyor". Malheureusement dans ce cas-là, six hélicoptères Wessex, trois Chinook et un Lynx coulèrent avec lui.

Un hélicoptère Chinook, le "Bravo November", joua un rôle primordial entre Goose Green et San Carlos. Le soir du 30 mai, il partit de San Carlos vers Mount Kent bourré de munitions et d'armes qu'il déchargea péniblement. Pendant les jours qui suivirent, cet hélicoptère demeura le seul moyen de transport capable de ravitailler les troupes au sol à cause des conditions atmosphériques défavorables et de l'état lamentable du terrain. Le 9 Juin, l'armée britannique décida de s'approcher de Port Stanley. Les hélicoptères opéraient sans relâche. Les Sea King des escadrons 825 et 846, les Wessex des escadrons 845, 847 et 848, de même que le Chinook de l'escadron 18, concentrèrent leurs efforts pour ravitailler les troupes sur les îles.

Finalement, le 14 Juin au matin, les hélicoptères britanniques eurent encore l'occasion de jouer un rôle offensif à l'ouest de Port Stanley. Ils attaquèrent des

blockhaus argentins, mais durent se résoudre à une retraite tactique.

Au grand total, 172 hélicoptères britanniques prirent part au conflit des îles Malouines contre environ 96 pour l'Argentine. Avec le recul du temps, il est évident que le succès des Britanniques aux îles Malouines fut assuré en bonne partie grâce au support des hélicoptères.

COMPREHENSION PRETEST

1. Dans la guerre des îles Malouines, l'hélicoptère a été le meilleur moyen de transport parce que :

   A. les jeeps et les chars étaient plutôt difficiles à transporter en quantité sur les îles.

   B. les distances entre les différentes îles étaient trop courtes pour utiliser les avions de transport à long rayon d'action.

   C. l'hélicoptère était le moyen de transport le mieux adapté au terrain accidenté et aux conditions atmosphériques dans la région des îles.

2. L'expression "les hélicoptères ... jouèrent un rôle primordial" veut dire que :

   A. les hélicoptères ont été les premiers moyens de transport envoyés à la zone de combat.

   B. les hélicoptères ont joué un rôle de première importance.

   C. les hélicoptères ont été utilisés au début de la guerre.

3. L'expression "l'armée argentine amena à pied d'oeuvre plus de 22 hélicoptères" veut dire que :

   A. l'armée argentine a réquisitionné ces hélicoptères pour service militaire.

   B. l'armée argentine a acheté ces hélicoptères pour service militaire.

   C. l'armée argentine commandé ces hélicoptères pour service militaire.

4. Pourquoi l'hélicoptère était-il si important pour les défenseurs argentins?

   A. L'hélicoptère servait à surveiller les mouvements des troupes britanniques sur les îles Malouines.

   B. L'appui de l'hélicoptère était nécessaire pour repousser une invasion possible des Britanniques.

   C. L'hélicoptère servait à transporter les blessés à des postes de secours en Argentine.

5. En envahissant les îles Malouines, les Britanniques:

   A. ont engagé toutes leurs forces aériennes, y compris des hélicoptères.

   B. ont choisi d'envoyer des hélicoptères plutôt que des bombardiers aux îles Malouines.

   C. ont lancé une contre-attaque vers le 6 Avril, à laquelle a participé l'escadron 846.

6. L'expression "l'armée britannique disposait de près de 54 hélicoptères" veut dire que :

   A. l'armée britannique devait vendre près de 54 hélicoptères.

   B. l'armée britannique voulait se débarrasser d'environ 54 hélicoptères.

   C. l'armée britannique avait environ 54 hélicoptères.

7. Deux des rôles principaux des hélicoptères britanniques ont été :

   A. de remplir des missions de surveillance et de servir d'appui aux attaques des bombardiers.

   B. de remplir des missions de lutte anti-sous-marine et des missions d'appui lors des débarquements de troupes.

   C. de lancer des contre-attaques et de protéger les appareils à bord des porte-avions "Hermes" et "Invincible".

8. D'après le texte, quelle qualité faisait de l'hélicoptère de transport un bon moyen d'appui aux débarquements ?

   A. Il pouvait transporter suffisamment d'hommes ou de matériel pour remplir de telles missions.

   B. Il pouvait s'approcher des postes des défenseurs argentins sans être aperçu par le radar.

   C. Il était polyvalent.

9. L'expression "l'Argentine lança une attaque de grande envergure" veut dire que :

   A. les forces argentines ont déclenché une offensive d'une grande ampleur.

   B. les forces argentines ont risqué presque toutes leurs forces dans une seule bataille.

   C. les forces argentines ont lancé un grand nombre de missiles.

10. Lors de l'attaque faite par les Argentins le 1er mai, comment les hélicoptères ont-ils protégé la marine britannique ?

    A. Leur radar a servi à prévenir la flotte de l'approche des avions ennemis.

    B. Ils ont protégé les navires de transport qui n'étaient pas armés.

    C. Ils ont protégé la flotte contre les sous-marins et les navires de surface des Argentins.

11. D'après le texte, les hélicoptères ont créé "un écran de protection" autour de la flotte britannique; cela veut dire que :

    A. les hélicoptères ont lancé des bombes fumigènes pour créer un rideau de fumée autour de la flotte.

    B. les hélicoptères se sont interposés entre les navires britanniques et les navires argentins.

    C. les hélicoptères ont survolé la flotte, prêts à lancer des missiles contre les navires de surface ennemis.

12. En remplissant leur mission de protection et de dépistage, quel était l'objectif des hélicoptères britanniques?

    A. Ils devaient essayer de détruire au sol autant d'avions ennemis que possible.

    B. Ils devaient essayer de couler autant de navires ennemis que possible.

    C. Ils devaient essayer de trouver le sous-marin argentin "San Luis".

13. Selon le texte, le sous-marin argentin "San Luis" "opérait dans les parages"; cela veut dire que :

A. le "San Luis" suivait un itinéraire parallèle à celui de la flotte britannique.

B. le "San Luis" exécutait une mission dans les environs.

C. le "San Luis" se trouvait tout près des îles Malouines.

14. Quand le destroyer "HMS Sheffield" a été détruit par un missile Exocet, quel rôle les hélicoptères britanniques ont-ils joué?

A. Le rôle de couler l'épave avec des missiles.

B. Le rôle de transférer des munitions et du matériel du "Sheffield" sur d'autres navires.

C. Le rôle de combattre l'incendie à bord du "Sheffield".

15. Selon le texte, les hélicoptères Lynx transportés aux îles Malouines par l"Atlantic Conveyor" furent d'un grand secours, pour la défense des porte-avions. L'expression "d'un grand secours" veut dire que :

A. les Lynx ont servi de postes de secours pour les porte-avions.

B. les Lynx ont rempli des missions de sauvetage lorsque les avions abattus sont tombés dans la mer.

C. les Lynx ont été très utiles en ce qui concerne la défense des porte-avions.

16. Dans la phrase "Durant toute la durée du conflit, tous les helicoptères restèrent en état d'alerte", l'expression "en état d'alerte" veut dire que :

A. chaque hélicoptère perdu était immédiatement remplacé.

B. chaque hélicoptère, ayant atterri, restait sur la piste.

C. chaque hélicoptère était prêt à être engagé dans la bataille

17. D'après le texte, les hélicoptères argentins qui "allaient immanquablement servir de vecteurs de troupes". Cette expression veut dire :

A. que les hélicoptères de transport argentins ne manqueraient pas d'effectuer leur mission.

B. qu'il était certain que les hélicoptères argentins seraient utilisés pour transporter hommes et matériel à San Carlos.

C. que les Argentins manquaient d'hélicoptères pour transporter hommes et matériel à San Carlos.

18. Quelle a été la raison principale pour laquelle les Argentins n'ont pas pu repousser l'attaque des Britanniques à San Carlos?

A. Ceux-ci ont lancé une attaque surprise.

B. Ils n'avaient pas assez d'hélicoptères.

C. Leur attention avait été détournée par un débarquement des S.A.S. à Goose Green.

19. Selon le texte, le soir du 30 mai, il partit de San Carlos vers Mount Kent bourré de munitions et d'armes qu'il "déchargea péniblement" les munitions et les armes qu'il portait. Cela veut dire que :

A. cet hélicoptère a déchargé avec difficulté les munitions et les armes.

B. cet hélicoptère a eu à peine le temps de décharger les munitions et les armes.

C. le pilote de cet hélicoptère risquait sa vie en échouant dans le déchargement des munitions et des armes.

20. La phrase "Avec le recul du temps, il est évident que le succès des Britanniques aux îles Malouines fut assuré, en bonne partie, grâce au support des hélicoptères" indique que :

A. les hélicoptères ont été, dans une grande mesure, responsables de la victoire des Britanniques.

B. un peu grâce aux hélicoptères, le succès des Britanniques dans la guerre était assuré.

C. la victoire a été assurée à part égale par l'action des hélicoptères et celle du reste des forces.