ReCALL **13** (1): 15–31. Printed in the United Kingdom

© 2001 Cambridge University Press

Evaluation of a Web-based language learning environment: the importance of a user-centred design approach for CALL

DOMINIQUE HÉMARD AND STEVE CUSHION

Language Studies Department, London Guildhall University, Old Castle Street, London E1 7NT, UK

(*e-mail: {hemard,cushion}@lgu.ac.uk*)

Abstract

This paper presents a twelve-month evaluation of a Web-based CALL Project at London Guildhall University, highlighting its rationale and objectives within the design process, the adopted methodology and its findings, shedding further light on students' attitudes regarding CALL design, multimedia delivery and language learning practices. The evaluated CALL environment, stemming from previously identified user requirements, combines both hypertext navigation with Java-written interactive CALL exercises and provides a built-in authoring mode for increased adaptability. Techniques used involved peer evaluation and discussions in the formative stages of the design as well as user walkthroughs, questionnaires and workshops in the summative phase of the process. Data related to requirements and feedback are presented, emphasising the user-centred approach and its integration within the design process itself. Finally, changes brought about by the evaluation are shown to illustrate the influence and impact the research undertaken has had on the original concepts and the design.

1 Introduction

Web-based CALL offers much potential and scope in terms of technological availability and general appeal. However, even if designing an interactive interface has become easier, CALL development must not only learn to better harness the new technology but also, and critically so, build on its knowledge of users and be more receptive to their needs if it is to benefit from Web-based delivery. A key aspect of this development rests on the need to involve learners and teachers, as users, in the design process in order to get valuable feedback regarding their views, reactions and demands. It is by doing this that a greater match will be achieved between educational theories and design objectives as well as between user requirements and functionality. Of crucial importance for the future of CALL, much needed qualitative and quantitative data must be gathered and disseminated to pool experiences together and help inform the design process.

On such a premise, this paper briefly introduces the CALL Project at London Guildhall University (LGU), with particular reference to its main characteristics including expertise, its context of use as well as users and a succinct description of its interface

https://doi.org/10.1017/S0958344001000313 Published online by Cambridge University Press

and interaction. The rationale for the approach follows in the form of high-level objectives and assumptions to be evaluated, separating students and teachers as end users with different needs. What ensues is the evaluation process itself, presenting the adopted methodology and emphasising its findings.

2 Overview

The CALL project presented in this paper started at London Guildhall University in September 1998, as a departmentally-based development funded by the university for a period of two years. Its main aim was to create and generate interactive language learning exercises on the Web as well as customised hypertext links to related Web-based material for the Department's existing Level 1 language units in French initially, followed by German, Spanish and English. More specifically, its design brief was to develop an interface accommodating a range of 'computerised' grammar exercises in the form of hypertext-linked Java applets, as well as an authoring tool to enable the subsequent automatic input of material by the teachers themselves.

In practice, the first year of the project was devoted to conceptual considerations, early prototyping and formative evaluation based on a selected Level 1, post-GCSE French unit, which was used as a pilot. For further details concerning conception, design decisions and solutions, please refer to Hémard & Cushion (2000a; 2000b). Following the initial development of a working prototype comprising both interactive interface and built-in authoring tool, the second half of the project concentrated on a summative evaluation as well as extending the language input to Level 1 German, Spanish and English units.

3 Main characteristics of the CALL project

3.1 Expertise

Much attention was paid to the planning and implementation of the design process, which required the relevant expertise in user interface design and Java programming combined with the experience and particular interest to consider pedagogical values and the potential impact such a new CALL environment could have in foreign language teaching and learning. This cross-pollination of disciplines, expertise and focus proved to be one of the main strengths of the project with its structured process, development and deliverables.

3.2 Context of use

The interface for these interactive exercises was conceived within the context of a curriculum-based environment and, therefore, designed to be used in formal classroom teaching as an integral part of the language programme as well as in open access mode for extended grammar support and Web-based activities. It was anticipated that students would practice CALL for at least one hour per week, timetabled from within the four- or three-hour teaching block assigned for their respective language units. Furthermore, provision was made for computer laboratories to be made regularly available to

https://doi.org/10.1017/S0958344001000313 Published online by Cambridge University Press

language students, under technical supervision, with a view to encouraging them to use existing facilities and enabling them to better benefit from self-study activities.

3.3 Users

The CALL project was designed to cater for two types of users. The main targeted user group consisted of Level 1 language students at LGU, whilst the second group was more finite and included language staff as potential authors of their own interactive material. The initial difficulty of addressing design issues pertaining to two different targeted user groups was eased by their clear identification and close location within the university. Moreover, the project greatly benefited from previous research findings (Hémard, 1998, 1999) further identifying both user characteristics and requirements relevant to the CALL interface. By the end of the first year, fifty Level 1 post-GCSE French students had been introduced to the new Web-based CALL environment on a weekly basis as part of their programme of study and, by the end of the second year, some two hundred language students had been exposed to CALL and interacted with the exercises within their given language syllabus, be it French, German or Spanish. At author level, the number of members of staff actively involved in inputting language material with the newly-designed authoring tool rose to five, or 25% of the departmental teaching team in the first year and increased to a potential eight in the second year, with varying degrees of involvement and interest.

3.4 Description of software

The evaluated software was designed to be used in conjunction with a first year, post-GCSE French unit (LFBC1). As such, its overall structure adopts a vertical grammatical progression based on the following interactive heading: "*Le Présent; Le Futur; L'Imparfait; Le Passé Composé; Le Passé Simple; Le Plus-Que-Parfait*". In turn, each one of these tenses leads to grammatical explanations (Formation & Valeurs), related interactive exercises and relevant Web-based interactive textual material. The grammar-based interactivity essentially revolves round gap-fill exercises, substitution, multiple choice and listening exercises. The whole Web-based environment is text-oriented with integrated sound. It is designed as a learning support and a tool for further independent study. Thus, it provides feedback on the basis of answers given by students (*Réponse juste, continuer; Essayer de nouveau*, etc.) but no formal assessment is provided apart from displaying indicative numbers of attempted questions and right answers on completion of exercises.

3.5 User interaction

The grammatical environment is designed for sequential interaction. Thus, its navigational mode is linear with hierarchical links, although at no stage is the interaction prescriptive (for further explanations on hypertext and hypermedia links see for instance Kommers *et al.* (1996)). Students are simply encouraged to enter the given right answer, if previous attempts have failed, before progressing to the next one, but the functionality of the software enables them to bypass the instruction if they so wish.

https://doi.org/10.1017/S0958344001000313 Published online by Cambridge University Press

The communicative Web-based environment offers an enhanced exploratory interaction, based on hypertext links, alongside a directed navigational mode exploiting relational links in the form of additional interactive textual material.

Students can attempt interactive exercises in any particular sequence and progress at their own pace.

4 High-level objectives and assumptions to be evaluated

Although conceptual considerations were very much framed within the known parameter of Web-based delivery for interactive grammar exercises and user requirements (Hémard & Cushion, 2000b), the design decisions adopted for the project reflected a greater range of targets linked to the perceived interactive potential of the technology, the context of use and its impact on language teaching and learning. Thus, the focus of the evaluation process centred on the following user-related, high-level design objectives and assumptions seen as defining the crucial design space (Boyle, 1997; Levy, 1999) to get feedback data from.

4.1 Students

At the level of students, the main prerogative was to design an interface applicable to their needs within the given context of use, both in formal classroom teaching but also in self-access interactive mode. Thus, it needed to be easily recognisable and easy to use by all students, given the current low level of ICT experience and, last but not least, appealing, harnessing state-of-the-art technology with the potential of Web-based delivery.

Furthermore, much attention was directed at the student interaction per se at three different conceptual levels related to use, language interaction and learning experience, best summarised here in the form of assumptions to be evaluated.

The first assumption was that the students would appreciate and feel confident enough to use different types of interactive links. The environment to be designed was conceived on the basis of a student-controlled navigational space supporting two generic types of interactive links. Directional interaction was primarily based on sequential links generating grammar-based exercises, themselves accommodating deductive and inductive learning modes, whilst embedded hypermedia links provided an exploratory environment more conducive to a communicative environment. However, if in design terms the objective was to introduce greater interactive flexibility, choice and, ultimately, student control, there was a need for specific evaluative data on the generated student interaction regarding link complementarily, compatibility and attractiveness.

A second assumption was that the students would relate better to the language, both in terms of its structure and role as content-based medium. However, if a mixed learning environment approach was adopted with a view to providing students with access to discrete, language-based, instructed interactivities as well as hypermedia links to relevant content-based resources, no data existed to suggest that such an interactive duality would help in bridging the gap between form and content. Of particular interest here was the need to identify factors likely to influence the effectiveness of the students' participation in the learning process. Indeed, known students' mental models (Hémard,

https://doi.org/10.1017/S0958344001000313 Published online by Cambridge University Press

1998) and epistemic beliefs related to the acquisition and structure of knowledge (Jacobson & Spiro, 1993) were seen as being still very much influenced by the prevailing culture of formal classroom teaching. Moreover, these deeply rooted mental models seemed to be further affected by the atomised form of teaching delivery created by timetable constraints and by the default language laboratory-based teaching approach which had been, and still was determining "the type of cognitive resources the students access in performing learning tasks" (Jacobson & Spiro, 1993:327).

The third and final assumption was that the new CALL interface would enable the students to make greater use of and, therefore, better benefit from existing open access sessions conveniently strewn across the timetable to facilitate independent learning. To this end, the software was not only made available on the network, but was also provided on a CD-ROM on request for those students who did not have access to the Internet or who simply preferred using stand-alone facilities. It was hoped that by providing easily accessible, supplementary and extra-curricular language material on the network and on CD-ROMs, students would be encouraged to devote more time to CALL activities and, as a result, acquire greater language exposure. Yet again, evidence was needed to ascertain whether this was the case or not and to gauge the impact the approach was to have on students' learning patterns.

4.2 Teachers

One of the important goals of the CALL project and indeed, judging by CALL historical development, one of the most elusive objectives to reach, was to facilitate and help generate the input of new language material by individual members of staff themselves. On the basis of existing evidence of authoring needs and use (see Levy (1998), Hémard (1998, 1999), Hémard & Cushion (2000a)), an authoring tool was devised in order to enable colleagues to convert existing paper-based exercises into the new interactive environment. Whilst design considerations (Hémard & Cushion, 2000a, 2000b) led to the development of a tailor-made tool, further evaluation was required to assess the degree of interest triggered in the process, its usability and, ultimately, the impact this authoring tool would have in helping to develop and stimulate the integration of new interactive CALL material into language units.

In the light of known user requirements, the design solution adopted for this authoring platform needed to deliver a working, efficient, simple and readily usable tool for language specialists with no prior authoring experience, no additional ICT skills and, above all, precious little time available. Given the wide range of interest and expertise, two usability goals were agreed upon:

- Teachers with little ICT experience would always be in a position to input the language material to be authored within their known word processing environment and transfer it into the authoring platform.
- Provision was to be made to facilitate the hypertext linking of authored interactive exercises to a Homepage, which authors could easily create within the tool itself, hence enabling them to design a complete package of exercises and help them develop a structural model of the tailored CALL environment to be designed.

https://doi.org/10.1017/S0958344001000313 Published online by Cambridge University Press

5 Evaluation

5.1 Methodology

> "If feedback is the 'breakfast of champions', then testing is the 'dinner of the gods'. However, careful choices must be made from the large menu of evaluation possibilities to create a balanced meal." (Shneiderman, 1998:124)

In this particular case, the 'balanced meal' of the CALL project was in many ways preconditioned by the above mentioned ingredients, identified as objectives and assumptions to be tested. For the *hors-d'œuvre*, to prolong the metaphor, expert users in the fields of language teaching, multimedia and Java programming were involved, in the initial stages of the design process, in a formative evaluation of early prototypes. The conduct of these expert reviews was greatly facilitated by the proximity, availability and previous collaboration with a number of colleagues and postgraduate students in both the Language Studies and the Computing Departments of the university. Whilst approaches differed between language teachers and their computing counterparts, ranging from informal to formal, these reviews generally took the form of regular discussions on aspects of the interface, content and planned interaction and resulted in the delivery of recommendations as well as technical reports identifying problems and suggesting solutions. Once this initial phase was satisfactorily completed, the 'main course' of the evaluation process, or summative evaluation phase, centred on testing the usability of the then ninth version of the prototype by students in formal classroom teaching and laboratory conditions and by teaching staff in a series of specially designed workshops. This critical part of the evaluation, which was carefully planned and funded, was also the most complex to realise inasmuch as two different groups of users, staff and students, were involved; but also because feedback was needed in different areas concerning interface design issues, language-related interaction and contextual issues such as accessibility, roles and patterns in the learning process.

5.2 Questionnaires

Although, from experience, questionnaires handed out to students as part of the internal monitoring system rarely seemed to be effective and useful, it was nonetheless felt that this evaluation method could be appropriately used in conjunction with others to provide further data on students' level of ICT competence, their views on the CALL interface and how they accessed it, if at all, within their own learning context. Moreover, such a method was deemed to offer a number of benefits since the new CALL interface was already being tried and tested in formal classroom teaching and it had the potential of reaching the so-called 'silent majority' amongst students. Thus the questionnaire, which was deliberately kept short and concise, sought feedback on student profile, in terms of ICT experience and confidence, and CALL exposure within their learning experience in the previously mentioned French pilot unit. Additionally, it asked the students to assess the usability, appropriateness and appeal of the CALL interface, inviting them to comment on its functionality and usefulness. Finally, it asked the students to assess and comment on their own interaction as it was important to know if exercises were attempted and completed and whether the interaction took place in self-access mode at home or in the Department's computer laboratories.

https://doi.org/10.1017/S0958344001000313 Published online by Cambridge University Press

5.3 User walkthroughs

The user walkthrough method (see Hémard, 1999), also called verbal or think aloud protocols (Bainbridge, 1990; Preece *et al*., 1998:621; Shneiderman, 1998:130), is primarily an evaluation technique designed to focus on the learnability and usability of a system. This method enables a design team, through the use of a prototype early in the development process or after implementation of a design, to be alerted to problems or misconceptions linked to the design of the system. It was felt to be a particularly appropriate approach in this case since valuable qualitative data could be obtained from the students' comments related to the interface, their own interaction and exploratory learning. Furthermore, the method was seen as being equally conducive to establishing and generating good collaborative work with the students concerned, facilitating in the process a fruitful exchange of information and a greater insight into the students' learning experience.

Five user walkthrough sessions of two hours each were organised for this evaluation over a period of five weeks in the summer of 1999. Students were selected on the basis of their IT profile. As a result, two teams of two Level 1 students took part in these evaluation sessions, one team with little computer experience and confidence whilst the other one was showing evidence of both, reflecting the overall student profile. Participating students did so voluntarily but were paid for it. They were made to feel part of the design process and the walkthrough sessions were carried out in a relaxed, almost informal manner, encouraging the students to speak their mind freely and express their views in the language register of their own choosing in order to eliminate inhibition and introduce as much authenticity as possible. The task to perform was purposely kept to its most open exploratory form and the students were carefully briefed regarding both the rules of the user walkthrough method and what was expected of them. In addition, they were given for reference the areas of investigation they needed to concentrate on. These were:

5.3.1 Aims of user walkthrough

- **To consider the design of the interface:** Is it clear, uncluttered, consistent, unambiguous, appealing, intuitive, and robust? Does the way it looks adapted to match your expectations?
- **To consider the user interaction:** Is it easy to use? Do you know what to do? Are the instructions explicit enough? Do you understand the structure of the designed environment? Can you navigate through it without getting disoriented? Can you access the program easily? Do you have control over the interaction or not? Is the interaction meaningful?
- **To consider the functionality:** Are available functions appropriate for the tasks to be carried? Are the navigational commands clear enough? Are the links easy to use? Is there feedback on actions taken? Is the feedback for given tasks appropriate?
- **To consider the multimedia impact:** Does it correspond to your idea of what a multimedia interface should look like? Is the multimedia presentation appropriate and useful? Does it provide additional information stimulating the interaction and the learning process?

https://doi.org/10.1017/S0958344001000313 Published online by Cambridge University Press

- **To consider the language learning experience:** Are the learning objectives clear enough? Should grammar be contextualized? Do you see the role of the computer as a support? A convenient tool? A tutor which should instruct and assess? Is the material provided appropriate for self-access? Distance learning? Is the language learning environment authentic enough? Is the language immersion satisfactory?
- **To further debug the program (if appropriate):** Spot and identify errors, faulty links, typos etc.

5.3.2 Data analysis

Verbal protocols were recorded with a tape-recorder and transcribed for the purpose of the data analysis. These transcripts, which reproduced the verbal exchange between two students, comprised declarative statements, explanatory comments and intentions to perform actions, queries, language-based exchanges and comments on interaction and outcome of actions. The empirical data was then analysed qualitatively by examining the task-related interaction, the strategies adopted by the students, the development of patterns, the identification of design faults and comments focusing on the resulting language learning process.

5.4 Workshops

In parallel with the above-mentioned summative evaluation, a series of four ninety minute workshops was run for language teaching staff and targeted authors throughout the second year with the fully operational prototype version of the authoring tool. The aims were to introduce these potential users to the concept of authoring within the language curriculum, to provide hands-on sessions to help them familiarise themselves with the interface and its functionality, but also to obtain as much feedback as possible from such an eclectic and disparate user group presenting a wide range of interests, motivation and ICT experience. Given the sempiternal timetable constraints, the varying areas of specialisation and current workloads of colleagues, attendance at these workshops was erratic, ranging from a high of twelve members of staff, or 60% of the departmental teaching staff, to a low of three, or 15%.

5.5 Strengths and weaknesses of the methodology

This evaluation was undertaken on the basis of a qualitative research inquiry, considered far stronger for exploring and shedding new light on multiple and complex cognitive processes generated by the language learning context and the computer interaction. Therefore, the main strength of the chosen approach must initially lie in the potential of its analysis for testing the above-mentioned assumptions and generally seeking answers to HCI questions related to user interface design. Furthermore, in addition to being appropriate for the tasks involved, its strength also rests on the variety and complementarity of the selected evaluation methods providing feedback from different sources, which ranged from the specific to the generic as well as from laboratory-based experiments to classroom experience. In turn, this important spectrum of different data

https://doi.org/10.1017/S0958344001000313 Published online by Cambridge University Press

sources, such as those presented in this paper, reinforces the quality and validity of the overall approach, by enabling the collected information to be compared and contrasted (Patton, 1987, 1990; Yin, 1994). Finally, its other strength must also be seen in its cost-effectiveness and practicality. The easy identification of user groups, their geographical proximity, their intertwined teaching and learning objectives and processes make such an evaluation method realisable and affordable.

However, weaknesses inherent to the chosen approach can similarly be identified and borne in mind when interpreting results. First of all, the software was designed in-house and evaluated with the university's own language students and colleagues, possibly, and if so unwittingly, influencing users' views and attitudes in the process. Secondly, even if the user walkthrough method yields a rich and interesting crop of information, the resulting data analysis is, nonetheless, time consuming and is, after all, only based on a small number of students. Finally, the questionnaire approach, designed to glean more generic data related to the user group as a whole, is flawed and inaccurate, as students are notorious at not filling them in or returning them and their motives for doing so can only lead to further speculation.

6 Summary of results

6.1 Results from questionnaires

Significantly, the questionnaires initially showed that only two groups of Level 1 French students out of three had used the new CALL interactive exercises on a weekly basis. This, coupled with the inevitable no-shows meant that 18 out of a potential 50 questionnaires, or 36%, were filled in and returned for this unit. It also meant that one member of staff had opted not to use the existing CALL exercises, let alone author new ones.

Out of these 18 students, eight or 44% indicated that they were experienced in the use of computers, an equal number said they had limited experience, whilst two or approximately 2% had none. Similarly, nine or 50% felt confident when using computers, seven or 39% expressed average confidence and two had none, correlating with IT experience. Assuming that these students were in any way representative of their peer group, a comparison with results obtained from a 1996 survey of French students at LGU (Hémard, 1998) showed that the situation regarding computer skills and confidence had evolved, even if changes had not been as radical as could have been expected. In 1996, Level 1 students only returned 24% of questionnaires, suggesting that CALL use had now increased with the latest exercises. Interestingly, the small but relevant percentage of students with no IT skills had remained the same, whilst the most encouraging shift was in the noticeable increase in students with experience and confidence, rising from 20% to 44%, thus substantially reducing the number of students who only had limited experience previously (see Table 1).

Overall, the students who filled in the questionnaires had enjoyed practising with the new software in class and were generally satisfied with its interface in terms of design and approach, although a fairly consistent minority of between 22% and 28% did not seem to show too much enthusiasm or interest. Exercises were considered useful by a large majority of students and they generally met their needs with a varying degree of success.

No obvious pattern emerged in the students' responses inasmuch as some experienced

https://doi.org/10.1017/S0958344001000313 Published online by Cambridge University Press

Table 1. *Extract from questionnaire analysis*

	Always	Most of the time	Some of the time	Never
a. Did you find the CALL exercises useful?	8 (44%)	6 (33%)	4 (22%)	
b. Did the CALL exercises meet your needs?	5 (28%)	8 (44%)	5 (28%)	
c. Did you enjoy practising with CALL?	7 (39%)	7 (39%)	4 (22%)	
d. Did you like the screen design?	5 (28%)	9 (50%)	4 (22%)	
e. Did you like the approach?	5 (28%)	8 (44%)	5 (28%)	
f. Did you complete the exercises?	7 (39%)	10 (56%)	1 (6%)	
g. Did you access CALL outside the classroom?	3 (17%)	3 (17%)	4 (22%)	8 (44%)

students were more critical than inexperienced ones and some inexperienced students appeared to be completely satisfied.

Of particular interest was the finding that students managed to complete the exercises most of the time whilst, disappointingly, eight or 44% of them indicated that they never accessed CALL outside the classroom. This showed that if CALL had been reintroduced into mainstream language teaching, its Web-based interactive potential had not yet been fully exploited as additional learning support. Moreover, it suggested that students had not been able to adjust their existing mental models of formal classroom teaching and what it entailed in terms of learning behaviour and commitments.

Few students took the opportunity to express further comments. One requested more machine responsiveness, another thought CALL could be useful but was too impersonal and a third one said that even if CALL was an effective form of teaching, there were not enough contact hours to justify using it in classroom conditions.

6.2 Results from user walkthroughs

For reference, the students with little ICT experience and confidence have been identified as Group A, and students with both ICT experience and confidence have been identified as Group B.

6.3 Design of the interface

- The overall design of the interface was not an issue for the students. They liked the simple display and the known browser environment with its recognisable functionality.

https://doi.org/10.1017/S0958344001000313 Published online by Cambridge University Press

- Recurrent comments indicated that they wanted systematic scoring displayed as well as greater visual feedback, although stopping well short of asking for any form of formal assessment. This suggested that the students were, possibly, more interested in securing a form of visual response from the interface as a necessary recognition and appreciation of the work done, than being genuinely keen on linguistic feedback leading to further corrections and more directed practical work.
- The point was made that sentences should be systematically numbered, thus making the exercises more finite. This suggested that the students would have welcomed the quantification of the interactive work which needed to be carried out (such as displaying the length of exercises), thus giving increased focus on tasks to be completed and making their progress through these tasks more easily identified.
- Overall, few comments concerning the interface design were expressed by the students with little ICT experience.

6.4 User interaction

- On the whole, both experienced and inexperienced students interacted within the environment in a linear, task-based manner. Typically, the first exercise would be accessed, to be sequentially followed by the second one down the list and so on, until all the exercises within the unit were considered attempted or completed. When such a topic-based unit was felt to be exhausted, the students would go back to the home page, choose the next topic and carry on.
- The marked difference between the two groups of students was in their use of the interactive space. On the one hand, the inexperienced students (Group A) progressed slowly and predictably through the proposed tasks, secure in the belief (tested in the initial stages) that they could always go back (linearity model) to the menu with the browser's own navigational commands. Since the interactive environment was curriculum-based, exploring it, with no strings attached, naturally meant undertaking the exercises until a reasonable number had been completed. However, this safe, task-based approach did not allow them to explore and interact with the multimedia material at the bottom of the list of topics, nor did it enable them to make much use of the grammatical resource, ignored for the first three interactive sessions. In this particular case, the model unwittingly adopted was overtly structural. On the other hand, the experienced students (Group B) always accessed the grammar support before attempting the exercises and, in some cases, went back and forth between the grammar and exercises, when in difficulty. Furthermore, they also visited and explored the multimedia space, albeit rather passively. As a result, the interaction was more fluid and combined both a strong structural element as well as a predisposition towards a more cognitive, task-based approach.
- Interestingly, for both groups, the student / student verbal interaction was very rich and sustained throughout the experiment, recording throughout the walk-through sessions exchanges on interface matters but also on linguistically related issues.

https://doi.org/10.1017/S0958344001000313 Published online by Cambridge University Press

6.4 Functionality

- Having got used to the navigational means provided, the inexperienced students demonstrated their new confidence and showed their awareness of the existing functionality when they remarked, in week four, that the grammatical support was not interactive. It is difficult to know whether they would have made use of it, had it been provided or discovered earlier.
- In one instance, the same Group A students thought that the checking mechanism could have been more specific and, therefore, more responsive to specific entries, instead of generating the whole answer in the form of the conjugated verb. This question of how sensitive, customised and complex the functionality should be is mooted elsewhere (Hémard & Cushion, 2000a, 2000b). This stemmed from a design decision to keep the interface as simple as possible, which led to short-circuiting superfluous or optional functions.
- Striving towards greater efficiency, experienced students felt hampered by the need to use both mouse-driven and keyboard functions at the same time. This was exacerbated when, in some cases (since rectified), the mouse pointer had to be entered into the answer box by the students before keying in the appropriate answer. This was considered extremely unhelpful and very distracting. This point was further made when the students commented very positively on the full mouse-driven multiple-choice presentation.
- In one case, the checking device was thought to be too rigid, giving the students the answers after their third attempt without warning them in advance. In this instance, shifting the control back to the computer, thus programming it to interfere with the student interaction, was counterproductive as it only illustrated the limitations and coercive nature of a semi-intelligent form of approach.
- Although sound was very much appreciated, the students would have liked greater control over it and would have welcomed a more sustained and systematic use of it. As a result, the sound-related functionality of the CALL environment is currently being developed.
- Not unlike Group A students, the experienced students would have liked a more tailor-made form of feedback, which would have processed their mistakes in order to generate more appropriate and more focused questions and answers. Beyond the technological minefield this would create, it further highlights the difficult and blurred demarcation line between the use of the computer as tutor or as tool. Similarly, it points at the difficulty of clearly identifying the type of access and use (support, self-access, distance learning), therefore the kind of projected interaction intended for the software being developed.
- Both groups of students felt and expressed the need for a function which would link the textual material to a glossary.

6.5 Multimedia

- The multimedia extension, in the form of original sound recordings of related textual material with visual illustrations, was integrated in two sections of the program and clearly defined in the opening menu as additional material. It essen-

https://doi.org/10.1017/S0958344001000313 Published online by Cambridge University Press

tially consisted of supplementary materials accessed from the Web for their linguistic value and presented with interactive exercises for further exploitation.

- Although incomplete, in the sense that the multimedia dimension was not present and systematic throughout the grammar units, it nonetheless provided some interesting data. First and foremost, Group A students never accessed it and no reasons were given for not doing so. One plausible explanation was that the multimedia material was, indeed, at the bottom of the list, therefore at the bottom of the screen, and the students never had the time or energy to look at it, let alone interact with it. If that were the case, one could deduct that multimedia, by itself, is not as attractive as is so often suggested. Another explanation could be that the students concentrated on what they perceived as being important, meaning course-related, and dismissed all peripheral material as superfluous.
- Conversely, experienced students did access the multimedia material, but since their interaction was linear and unit-based, it was always done at the end of the session, since the multimedia environment was at the bottom of the list of interactive units. However, although seemingly impressed by the authenticity of the recordings, they adopted a very passive approach and did not interact with the exercises provided. Yet again, one could hazard a guess that the students, by then, were reaching saturation point and only felt conscientious enough to complete the exploration of the space as instructed. Another explanation could be that the students automatically reverted to the passive navigational mode often observed when 'surfing' the Web. Finally, it could simply be that the material itself, of an historical and political nature, was of no interest to these students, suggesting that its potential did not generate the expected enthusiasm and resulting interactive impact. Indeed, there is always the danger of expecting students to follow in the footsteps of the teacher's own interests.

6.6 Language learning experience

- Strikingly, as previously mentioned, the overall interaction was linear and exercise-based, generating many protracted exchanges on linguistic matters. Exercises were, on the whole, completed, even if at times the students' concentration and motivation were wearing thin.
- The students also showed that, although conscientious and rigorous, they quickly established some form of control over their interaction, indirectly setting their own learning approach and agenda. For instance, Group A students aimed at completing as many of the exercises as possible even if this meant ignoring other parts of the environment or resorting to easy shortcuts like obtaining clues or skipping exercises on the basis that there was duplication. Notably, the more coercive the exercise (valeurs in particular), the more removed and resilient the students were, thus showing their determination to complete the task whilst reaffirming their control over the interaction.
- When an exercise was deemed difficult, Group A students would simply adopt what could be described as a face-saving position, by being flippant and dismissive, in an attempt to regain the upper hand, whilst blaming the computer for the poor score they had obtained.

https://doi.org/10.1017/S0958344001000313 Published online by Cambridge University Press

- In many ways, Group B students behaved very much like their Group A counterparts, attempting and often completing exercises, generating in the process much valuable verbal linguistically-oriented exchanges. However, their fuller exploration and more fluid interaction led to a more in-depth learning experience, benefiting as it did from the systematic use of the grammatical support.
- Of great interest in this case, it felt as though the more confident the students were at using and interacting with the computer, the less acceptable it became for them to be wronged by it. Therefore, not only did they also challenge the validity and veracity of the answers when an error had occurred (like Group A students), they similarly reacted forcefully against what they could only perceive as flaws in the system or inadequacies (such as the lack of appropriate linguistic feedback) and weaknesses of the interface when perplexed or stalled by a language-based incomprehension. When the results were good or exercises easy and short, the students were motivated, keen and excited, understandably so. However, when it was tougher, when they would reach what they perceived as a linguistic stalemate or general incomprehension (instructions, answers given or feedback), then their frustration and annoyance would rise exponentially against the machine, seen as deaf and useless, and against the absurdity of the situation, which provided no solutions. The question raised here is crucial to CALL development. When the grammatical point to be conveyed is difficult or when the linguistic going gets tough, how much information and explanation can you provide, how specific and tailor-made can these get and what type of learning objectives should the program be aiming at? Ultimately, beyond the linguistic database provided, can the computer handle the learning process and if so in what capacity?
- As with Group A students, when in difficulty or when the exercise was seen as taxing or ‘boring’, Group B students could become increasingly distant from the on-going interaction, treating the whole exercise lightly if not jokingly, laughing at their lack of linguistic grasp in order to deflate a potentially ridiculous situation and prevent it from developing further.
- Finally, it seemed as though the winning interactive formula was based on giving students well defined tasks within an authoritative environment, which provided them with both complete interactive control as well as recognition. Indeed, tasks were best seen as finite and manageable entities and even if the students did not want any form of formal assessment, they still needed some means of appreciation based on their performance, such as feedback and scoring, for reference and reassurance of work done and, hopefully, for self-satisfaction. Crucially, the CALL environment had to be authoritative for, if the validity and veracity of the interface was challenged under strain, its interactive material had to be particularly accurate and exhaustive to provide as much support as possible and thus secure the best possible performance. Ultimately, beyond the design of the interface, the interaction had to be as transparent and consistent as possible. It supported the view that a computer could not be made to behave intelligently and, therefore, could not be programmed in such a way as to trick students or be voluntarily opaque or complex in the hope that the student might rise to the challenge and unpack the material. Evidence was there to prove that it was not the case.

https://doi.org/10.1017/S0958344001000313 Published online by Cambridge University Press

6.7 Results of feedback from workshops

The spectrum of ICT experience and confidence demonstrated by the language teaching staff present at the workshops was, on the whole, wider than anticipated, and in some ways not unlike that of students with at least two members of staff with very little ICT knowledge and no overt interest in the field.

Although the authoring software had been designed within a Windows-based environment and its expected interaction voluntarily kept simple and compatible with known word processing functionality, a number of questions highlighted problems, which had not been anticipated. For instance, one member of staff had never used CD-ROMs before; similarly, a minority of colleagues did not seem to be conversant with Windows Explorer and its file managing facility. This, obviously, created serious confusion when the authoring tool automatically requested the user to enter a filename for the newly created file using the standard 'Save as' dialog box, assuming that the user could create a separate directory for the purpose of storing and accessing these CALL files.

Interestingly, inexperienced users could not easily relate to the copy and paste functionality between two separate windows. As a result, copying from the initial Word environment and pasting on to the authoring platform could lead to documents being lost or errors occurring when the operation was repeated several times. What seemed to work well with these users was that the machine-generated functionality could be bypassed and the language material and authoring instructions could be typed directly and simply into the authoring tool. Even if this approach under-utilised the tool provided, it nonetheless enabled language material to be entered for the first time by teachers with no ICT experience, let alone authoring skills.

Conversely, advanced users quickly saw the benefit such an automated authoring approach could have in terms of reducing work and increasing the speed of delivery, requesting additional menu-driven functions such as a preview facility and, more ambitiously, sound authoring. They were particularly impressed by the facility enabling them to create a Homepage within the authoring platform, helping them in the process to link their newly created exercises and to construct a structural thread between them.

Above all, however, by seeing such different uses and approaches, it felt as though the most important objective of the authoring platform, which was that of catering for all users regardless of their experience, had been met.

7 Changes brought about by the evaluation

Overall, a number of changes were made to the design of the interface and its combined authoring platform concerning the display, the functionality, the user interaction as well as the feedback and help provided, in an attempt to establish a closer match between requirements and design. Aside from correcting bugs, these ranged from introducing shorter exercises and systematic scoring, to providing greater on-line support. However, of particular significance in this case, changes also occurred in the fundamental positions that had been adopted at the onset.

At the level of students, the interface was designed on the assumption that students would appreciate and be attracted by the dual combination of directional and

https://doi.org/10.1017/S0958344001000313 Published online by Cambridge University Press

navigational interaction. In turn, it was assumed that they would better relate to the potential of language as medium, generating greater self-access. This proved more elusive than anticipated as students seemed to reproduce or respond to well entrenched mental models associated with their own learning context. Firstly, their interaction was conditioned by a structural approach, generating a linear progression better associated with traditional classroom teaching than with CALL. Secondly, when in navigational mode, the students appeared to adopt the classic but counterproductive model of passive exploration so common in Web interaction. Finally, even if the percentage of students now claiming to access CALL outside the classroom was encouraging, the new CALL environment has not, as yet, succeeded in changing the learning pattern of the majority of the students concerned, thus creating little impact on the existing language culture and exposure. On this premise, the expected cross-fertilisation of interactive approaches did not materialise, and more work is currently being undertaken to develop and enhance hypermedia links and multimedia extensions in order to accommodate form and content better and strengthen the *raison d'être* of the CALL interface.

At the level of teachers, design considerations, similarly, changed from the original position adopted for the authoring approach (refer to Hémard & Cushion, 2000a). Given the perceived low level of ICT competence amongst the language teaching staff, the initial design decision consisted in separating clearly the language input, written in Word by the teacher, from the authored output, controlled by the design team. As some colleagues became increasingly involved in the design of the interface and the language authoring process, this initial position evolved quite radically leading to the development of a stand-alone piece of software capable of taking a cut and paste insertion from Word, but which could also be used completely independently. Thus, the shift in positions evolved from asking teachers to format their text in a standard machine-readable way, to providing computer support for such formatting and, finally, integrating this approach so that the word processing environment, whilst still applicable, became almost peripheral, merely serving to transfer previously typed material.

8 Conclusion

Beyond the practical developmental considerations presented here and hopes for future applications, this paper strove to highlight both the nature and the impact of the research undertaken through its methodology, its findings and its influence on the design. It corroborates the view expressed by Esch and Zähner (2000) and Levy (1999), amongst others, that future CALL developments and, in particular, Web-based language learning deliveries can only be successful on the basis of a close involvement between language teachers and learners. CALL deliverables should not simply be seen in terms of finished products destined for immediate and compulsory consumption by students, assuming designers know best, but as a means of exploring new forms of interaction at the level of the interface as well as within the language learning process itself. As can be seen by this evaluation, much still remains to be done to know the users and cater for their needs, be they students or authors, but it is to be hoped that by having emphasised the adoption of a qualitative research focus, this approach can contribute to future CALL design.

https://doi.org/10.1017/S0958344001000313 Published online by Cambridge University Press

References

Bainbridge, L. (1990) Verbal Protocol Analysis. In: Wilson J. R. and Corlett E. N. (eds.), *Evaluation of Human Work: A Practical Ergonomics Methodology*. London: Taylor and Francis, 161–179.

Boyle, T. (1997) *Design for Multimedia Learning*, London: Prentice Hall.

Esch, E. and Zähner, C. (2000). The contribution of Information and Communication Technology (ICT) to language learning environments or the mystery of the secret agent. *ReCALL*, **12** (1): 5–18.

Hémard, D. (1998) Knowledge Representations in Hypermedia CALL Authoring: Conception and Evaluation. *Computer Assisted Language Learning*, **11** (3): 247-264.

Hémard, D. (1999) A Methodology for Designing Student-Centred Hypermedia CALL. In: Debski R. and Levy M. (eds.), *WorldCALL: Global Perspectives on Computer-Assisted Language Learning*, Lisse: Swets & Zeitlinger, 215–228.

Hémard, D. and Cushion, S. (2000a) Authoring a Web-enhanced interface for a new language-learning environment. *ALT-J, Association for Learning Technology Journal*, **8** (1), 41–9.

Hémard, D. and Cushion, S. (2000b) From Access to Acceptability: Exploiting the Web to Design a New CALL Environment. *Computer Assisted Language Learning*, **13** (2), 1-16.

Jacobson, M. J. and Spiro, R. J. (1993). Hypertext learning environments, cognitive flexibility, and the transfer of complex knowledge: an empirical investigation (*Report No. CSR-TR573*). Urbana, IL: Office of Educational Research and Improvement. (ERIC Document Reproduction Service No. ED 355 508).

Kommers, P. A. M., Grabinger, S. and Dunlap, J. C. (eds.) (1996) *Hypermedia Learning Environments, Instructional Design and Integration*. Mahwah, New Jersey: Lawrence Erlbaum.

Levy, M. (1997) *Computer-Assisted Language Learning – Context and Conceptualization*. Oxford: Clarendon Press.

Levy, M. (1999) Design Processes in CALL: Integrating Theory, Research and Evaluation. In: Cameron, K. (ed.), *Media Design and Applications*. Lisse: Swets & Zeitlinger, 83–107.

Patton, M. Q. (1987) *How to use Qualitative Methods in Evaluation.* Newbury Park, CA: Sage.

Patton, M. Q. (1990) *Qualitative Evaluation and Research Methods*. Newbury Park, CA: Sage.

Preece, J. *et al*. (1994) *Human-Computer Interaction*, Wokingham, UK: Addison-Wesley.

Shneiderman, B. (1998) *Designing the User Interface; Strategies for Effective Human-Computer Interaction*, Addison-Wesley.

Yin, R. K. (1994) *Case Study Research: Design and methods*. Thousand Oaks, CA: Sage.

https://doi.org/10.1017/S0958344001000313 Published online by Cambridge University Press