

Chapter 6 System Design

6.1 Introduction

CALL is not yet a mature field and lacks an accepted research methodology. Rather, methodology is an active area of research within the CALL community. CALL practitioners implement CALL software using a range of methodologies. Unlike the field of Software Engineering (Sommerville, 1996), they do not have tried and tested approaches to design and development. This chapter introduces the idea of a template and outlines the design of the template implemented in the present project. As a starting point, the CALL Methodological Framework suggested by Hubbard (1996) is described in section 6.2. The various design decisions that were made to produce the project template design are stated. It introduces the framework and its three constituent modules (Development, Evaluation and Implementation). Section 6.3 covers the Development module, with its approach, design and procedure components. The Evaluation module is dealt with in section 6.4 and section 6.5 describes the Implementation module. Section 6.6 describes the design of the template as it relates to the Development module. This section includes a description of the syllabus, a discussion on screen design issues as well as the other elements of the Development module. Section 6.7 discusses the evaluation of the courseware while section 6.8 covers the implementation (or deployment) of the courseware.

6.2 CALL Methodological Framework

Hubbard (1996) outlines a CALL Methodological Framework by breaking CALL down into its essential elements and describing how those elements interact. The present project uses this framework with some modifications where required. It considers the special qualities and challenges of the computer (not only classroom) environment.

The Methodological Framework consists of three components: development, evaluation and implementation. Figure 6.1 shows the relationship between the three modules of the overall framework. The solid arrows show how the development precedes evaluation, while both development and evaluation precede implementation. The dashed arrows show that the evaluation can inform development and that implementation can inform both development and evaluation. (Note that implementation refers to the implementation/deployment of courseware, not of the development process, which is the usual interpretation of the term in the Software Engineering domain).

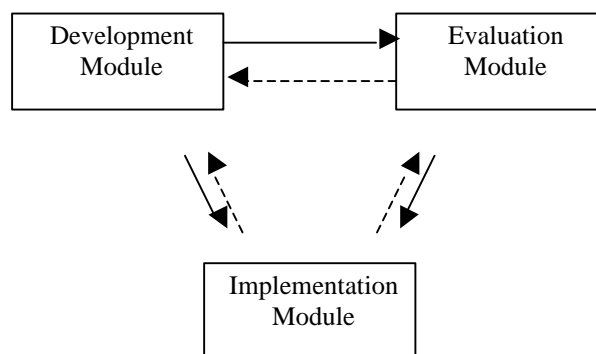


Figure 6.1 Hubbard's (1996) CALL Methodological Framework

The goal of the Methodological Framework is to provide a neutral instrument for developing, evaluating and using CALL materials. The underlying principles are that the framework should:

- be consistent with established frameworks for language teaching methodology,
- be method-neutral and flexible,
- explicitly link development, evaluation and implementation considerations in a consistent fashion,
- identify the relevant elements in each area and describe the interrelationships of those elements.

6.3 The Development Module

The development module consists of three parts: approach, design and procedure. Approach reflects the theories of language structure and language learning assumed by the method. It is relatively abstract in that it concentrates on principals rather than specifics. Design incorporates the goals and objectives of the syllabus and the roles of the teacher, learner and materials. Procedure includes a collection of exercises, techniques and activities. Each part will be considered in turn, starting with Approach. Figure 6.2 shows the elements of each section and their interaction.

6.3.1 Approach

The two determining elements within the approach category are linguistic assumptions and learning assumptions. **Linguistic assumptions** include the developer's understanding of the nature of language and the importance of structural, social and cultural aspects. **Learning assumptions** encompass the understanding of the nature of the second language learning process and the role of the learning environment. These two elements help determine the **language learning approach** that will be used.

There are many different approaches, but Hubbard mentions behaviourist, explicit learning, comprehension-based, communicative and humanistic approaches as some of the better known approaches (Hubbard, 1987). Language learning approaches have their origins in the classroom, but the **computer delivery system** allows for individualisation. While some see it as a dehumanising machine, it has the capacity to bring the learners into contact with other humans (as in Computer Mediated Communication). Some CALL courseware assigns "human" characteristics to the tutor to mitigate against this dehumanising factor.

Just as a teacher can be boring and unmotivating, so too can a piece of courseware be considered tedious and mechanical. However, Hubbard notes that the "anticipatory interaction" (e.g. providing the learner with limited but potentially useful simulations of communicative interaction) offers options not possible with the traditional textbook.

The considerations of the language teaching approach and computer delivery system determine the approach-based design criteria. For example, humanistic, communicative approaches may include the following points:

- the courseware provides meaningful communicative interaction between the student and the computer,
- the courseware provides comprehensive input at a level just beyond that already acquired by the student,

- the courseware promotes a positive self-image in the learner,
- the courseware provides a challenge but does not produce frustration or anxiety,
- the courseware acts effectively as a catalyst to promote learner-learner interaction in the target language.

Provided that they are adhered to, such a set of criteria can help to ensure a high degree of consistency in the final product.

6.3.2 Design

The Design component consists of the specification of the goals and objectives of the method, and their actualisation through the syllabus and the roles of the teacher, learner and materials. The area **learner profiles** concerns the intended audience for the courseware. Factors to consider include learners' proficiency level, age, native language, and needs. The approach-based design criteria will influence the **syllabus**, which is concerned with the learning objectives and how they are obtained.

Learner profiles and syllabus impact on decisions on **language difficulty**, **program difficulty** and **content**. Factors such as familiarity, concreteness and length play a role in determining language difficulty. Program difficulty relates to non-linguistic aspects, mainly redundancy, input and timing (although there are others). The degree of difficulty should not erect additional barriers to learning. Content may address specific syllabus goals or the perceived needs and interests of the students.

Learning style (in this context) describes the type of learning supported by the activity. Activities include recognition, recall, comprehension, experimental learning and constructive learning (Kemmis et al., 1977). Other classifications include inductive-deductive, and form vs. meaning focused (see section 2.3, p21 for more details).

Program focus and learner focus determine the majority of the pedagogical content. **Program focus** refers to the linguistic objective of the activity (e.g. phonology/graphology, and discourse/text). **Learner focus** refers to the skill area covered by the courseware (usually reading, writing, listening and speaking but may include others). **Classroom management** is often overlooked. It considers how the students will be grouped in relation to the computer (alone, in pairs or in larger groups).

Hubbard places hardware and programming language considerations in the Design component in his Methodological Framework. Hardware considerations include platform (PC or Mac), medium, and input device. Programming languages range from authoring languages to general purpose programming languages. There is always a trade-off between ease of use and flexibility.

6.3.3 Procedure

The elements to be considered in the layout of the program that presents the materials are considered in the Procedure component. One important element to consider is **activity type**. There are seven options: game, quiz, text construction, text reconstruction, simulation, problem solving and exploratory. Other classifications include drill, practice and tutorials.

The description of the **presentational scheme** can be quite complex. It will include a description of how the material is to be presented as well as how the learner will interact with the program. Although there are many possibilities, most presentational schemes are computer versions of classroom exercises. As the presentational scheme is at the centre of the Procedure component, it has a strong influence on screen layout, control options, input judging, feedback and help options.

The **screen layout** includes presentation of text, graphics and sound (and the use of colour). **Control options** refer to whether the learner or the program has control. **Input judging** refers to the type of learner responses allowed by the program and the operations the program will perform on them. They range from simple multiple choice to phrases and sentences of text or speech.

There are a number of different types of **feedback**, including:

1. an indication of the correctness or incorrectness of the answer,
2. a comment as to the reasons for an answer being correct or incorrect,
3. a score, grade, or other cumulative evaluation,
4. tutorial information (such as suggestion to review other material).

The feedback can be direct or indirect. Examples of direct feedback include indicating if an answer is correct or not, providing a comment to the user about his/her answer and giving the user marks for exercises. An example of indirect feedback would be the flagging of missed items for automatic review.

Help options can include hints or a review of instructions or content. The aim is to emulate what a teacher may do in a given situation.

All of the elements in the Development module influence the **courseware production process**. The courseware package includes the courseware and other items such as a tutorial on how to use it, a textbook, and documentation.

6.4 The Evaluation Module

In evaluation, the aim is to determine the fit of the courseware to the needs of the learners. Figure 6.3 shows the elements in the Evaluation Module. There are three components: teacher fit, learner fit and operation description. The focus here is on pedagogical issues and elements such as hardware compatibility, operational reliability and cost are not considered.

The procedure elements of the development framework are included in the **operational description**. Note that the operational description is at the top of the model, thus implying that its elements are determined first, which should be an objective enterprise. (Teacher fit and learner fit may be more subjective).

Items to consider within **learner fit** include:

- does the presentational schema fit the learners' learning style?

- are the program focus and learner focus appropriate for the learners' needs as determined by the syllabus?
- is the language difficulty at the right level given the learners' proficiency?
- is the feedback understandable and useful to the students?

A list of pertinent questions can be prepared as required.

The **teacher fit** component matches that of the approach component in the Development module. Linguistic and learning assumptions are combined into the language teaching approach, which with the computer delivery system yields the approach-based evaluation criteria. These can then be used to determine the degree of fit between the teacher's view of successful language learning and the courseware.

6.5 The Implementation Module

This refers to the usage of the developed courseware and consists of more elements than just sending the learners to the computer lab. Figure 6.4 shows the elements to be considered if the courseware is to be effectively implemented.

Accessibility refers to the availability of a computer to use the software. **Preparatory activities** refer to what the learner does before starting a lesson (for example, a **tutorial** on how to use the courseware or **content preparation**). This is an area that is often overlooked. Many elements contribute to learner use of courseware. Follow-up activities (for example, by providing follow-up materials) are often neglected.

Teacher control is often underestimated in the CALL experience (Hubbard, 1996). Decisions about teacher control will come from the teaching approach, the syllabus and the learner profiles. Teachers can control the accompanying preparatory materials (if any, or create some if not). Authoring may provide the teacher with a mechanism to amend or add to the courseware (add or augment exercises, for example). Depending on the circumstances, the teacher may be able to control which packages and lessons the learner can use and when. Control setting may provide options to control the level of help and feedback provided by the system to suit a given teaching situation.

Teachers obviously can work directly with the learner(s) also, for example, sitting with a group of students around a computer. Issues of classroom management need to be considered, as some programs may be more suited to group use rather than individual use. Site monitoring, whereby the teacher works with students in the computer lab, can be useful for gaining insights into how the students interact with the courseware. This information can be used when making control decisions.

Student records can also provide useful information to the teacher. Such information may include which lessons a student has used, how much time was spent on each lesson, and scores for the activities. Lab logs and student feedback forms are other methods of obtaining student information.

Hubbard (op. cit., p. 31) notes that poor implementation can render good courseware practically useless while imaginative implementation can enhance the value of dull or average courseware. He states that CALL courseware should be considered as people teaching people through the medium of the computer (and not as computers teaching people). Hubbard concludes that understanding and considering the elements involved in CALL will lead to better development, evaluation and implementation.

6.6 Template Development Module

This section outlines the design of the template, based on the methodological framework developed by Hubbard. Hubbard's framework was adopted as it is very comprehensive and flexible and draws on previous related methodological frameworks (Anthony, 1963; Richards and Rodgers, 1982; Hubbard, 1987, Hubbard, 1992). Section 6.6.1 explains the approach adopted. Section 6.6.2 covers the design component, with an explanation of the various elements, including learner profile, syllabus and focus. Section 6.6.3 deals with the procedure component, most notably the presentation scheme. Section 6.6.4 provides a summary of the completed courseware.

What is Meant by a Template

In the present project, the term template refers to a framework that encompasses both high-level design elements (syllabus content, lesson plans, and screen design) and low level elements (XML data files).

The template provides:

- a structure for the courseware (text, audio and image data),
- a processing engine to act upon the courseware,
- a mechanism to use the above to create CALL material.

Not only does the template create online materials, it can also produce a CD version of the language learning course. Even more important given the target environment of EL communities, it can produce a printed version, so that communities that do not have computer access (currently) can still use the developed courseware.

6.6.1 Approach Component

Approach-Based Design Criteria

The template adopts a humanistic, communicative approach to language teaching. The communicative approach to language teaching is one in which the focus is on processes of communication rather than on structural, functional, or notional items (Nunan, 1988: p158). Apart from exposing the student to the language and enabling a certain level of communication with the computer, it aims to promote a positive self-image in the learner. Given the envisaged learner profile (see section 6.6.2.1), the activities and exercises are not too difficult – they provide a challenge but try to avoid producing frustration or anxiety in the learner. The template also hopes to act as a catalyst to promote learner-learner interaction in the target community. For example, some of the language learning tips in the template suggest that it is useful to seek out opportunities to speak the target language. Thus learners will be encouraged to seek out other learners and also current speakers of the language.

6.6.2 Design Component

This component specifies the goals and objectives of the method.

6.6.2.1 Learner Profile

When developing any computer program, the needs of the user are pivotal. When developing a language learning course, the profile of the target user must be a driving factor in the whole process. The same holds true for a CALL program: in order for the program to be successful the design must consider the target user group.

While a language-teaching establishment may be able to tailor a language learning course for a specific student, generally speaking they will have a target user group in mind. Similarly, a CALL system is usually developed with a particular target group in mind. Factors that define a user group include target language ability (from absolute beginner through to advanced), purpose for which the language is being studied, age profile and learning needs of the students. The level of education of the students must also be taken into consideration.

The framework should cater for more than one target user group. However, I believe that there are some general characteristics that hold for the sub-group of EL learners. These include:

- their target language level is absolute beginner to beginner,
- their level of computer knowledge is very limited (if it exists at all),
- the desire to learn the community language for cultural or ethnic identity reasons.

In the present project, there are two target user (learner) groups. One is the (young) adults of the Pipil community and the other is descendants of the Pipil in El Salvador. In the case of the members of the Pipil community, the level of education is quite low, with most only having three years of formal schooling and they have little to no experience of computers. In the case of the second group, perhaps several generations removed from the Pipil community, the level of education may be higher and they have some computer knowledge. The target language level for both groups is absolute beginner to beginner. Their perceived purpose is to learn their own traditional language. Their motivation level could be described as moderate. Their learning needs are to be able to converse in everyday situations.

6.6.2.2 Syllabus

This section reviews the main syllabus design issues and explains the structure of the template syllabus. It outlines the different types of syllabi in general and how lessons are structured. It points out some of the specific issues that arise in the case of ELs. The syllabus of the template is then presented.

Needs Analysis

One thing that generally precedes the development of a syllabus is an investigation of the needs analysis of the learner. Nunan (1988) remarks that this is a major trend in recent years as part of the movement from a teacher-centred to learner-centred focus. Assumptions about the learners' purposes in undertaking a language course can affect the design of a syllabus.

Amongst the items usually considered during the process of syllabus design are learning purpose and learning goals. While the Munby (1978) approach has been criticized for being too mechanistic (and individualistic), the components can be used as guidelines in the application of needs analysis to language syllabus design.

1. Participant - information about the learner's identity and language skills,
2. Purpose domain - why the language is required,
3. Setting – the environment in which the language will be used,
4. Interaction - the people with whom the learner will be interacting,
5. Instrumentality – the medium, mode and channel,
6. Dialect,
7. Target-level – the degree of mastery required,
8. Communicative element – the productive and receptive skills the learner will need to master,
9. Communicative key – the interpersonal attitudes and tones.

Syllabus Type

A syllabus can be classified as either product-oriented or process-oriented. A product-oriented syllabus is one in which the focus is on the knowledge and skills which learners should gain as a result of instruction, whereas a process-oriented one focuses on the learning experiences themselves (Nunan, 1988). Interaction with the computer is not the target environment (i.e. the students are not learning Nawat so that they can use the computer). Thus, a product-oriented approach has been adopted. In the constantly changing field of syllabus design, the distinction between product-oriented and process-oriented syllabi is becoming more blurred. It is probably better to view them as end points along a continuum, so that a syllabus can be considered to have elements from both orientations.

Within a product-orientation, there is the synthetic/analytic dimension to consider. The synthetic approach teaches different parts of the language separately in a step by step manner until all aspects of the language have been acquired (Wilkins, 1976). An analytic syllabus is one that is organised in terms of the purpose for which people are learning a language, with items of varying degrees of difficulty being presented. An analytic syllabus assumes that language can be learned holistically (in chunks). It takes some non-linguistic base as its starting point (but may incorporate grammatical items thereafter). It uses situations, topics and themes.

One type of synthetic syllabus is the grammatical syllabus. In a grammatical syllabus, one item is introduced at a time with the idea being that the item must be mastered, before moving on to the next one. Items are graded according to grammatical notions of simplicity and complexity. Some items that could be considered grammatically simple will not necessarily be that easy to learn and vice-versa. Pienemann and Johnson (1987) report that psycholinguistic processing difficulty rather than grammatical complexity determines the acquisition of grammatical structures. They claim that learning difficulty, which is determined by several factors including short-term memory, is what determines what items a student can learn at a given stage in the learning process and that grammatical difficulty is not a determining factor. For example, the third person 's' morpheme in English is grammatically fairly straightforward but is it

notoriously difficult for learners to master. They suggest that this is due to the fact that the form of the verb is determined by the person and number of the noun or noun phrase in the subject position, which the learner has to remember when producing the sentence. Thus, short-term memory constraints, rather than grammatical structure cause the difficulty.

Functional-notional syllabi attempt to incorporate a broader view of language. Functions refer to the communicative purposes to which the language will be used while notions are the conceptual meanings expressed through language. While many benefits of functional-notional syllabi have been cited (Finocchiaro and Brumfit, 1983), including the setting of realistic learning tasks and the provision for the teaching of everyday, real-world language, they still fall within the synthetic classification.

Syllabus versus Methodology

There is a debate as to the distinction between Syllabus Design (what) and Methodology (how). In the past, the boundary was more clear cut, but now it has become somewhat blurred, with Syllabus Design sometimes incorporating elements of methodology.

Structure of a Language Lesson

There are four dimensions to the structure of a language lesson: opening, sequencing, pacing and closure (Richards and Lockhart (1994)). In the opening, the aim is to help learners to relate the content of the new lesson to that of the previous lesson. This can be done by describing the goals of the lesson and by stating the information or skills the students will learn.

Sequencing deals with the sub-activities of each lesson. A typical format is to present new vocabulary, text and meaning. There are general principles for determining the internal structure of lessons (for example, simple before complex and receptive before production skills). Different teaching methodologies have different approaches but in general the move is from controlled to free form. For example, the student usually progresses from reusing fixed format phrases to the production of phrases that have variable form.

Pacing is the extent to which a lesson maintains its momentum and communicates a sense of development. Over-lengthy explanations should be avoided and activities of an appropriate level of difficulty should be selected.

Closure reinforces what has been learnt in the lesson. It can integrate and review the content of a lesson and prepare the students for further learning.

Syllabus Design and ELs

A lot of the literature about SLA and Foreign Language learning is based on the study of ESL (English as a Second Language) and EFL (English as a Foreign Language). There are journals devoted to this theme alone. It is no surprise that much of the material studied about syllabus design in general comes from the ESL and EFL domains. While there may be common elements to any language learning syllabus, there

are also differences (depending on L1/L2 combination, learner level, and context – either Second Language or Foreign Language environment). These had to be dealt with in the syllabus design phase.

Needs Analysis

The first difference that emerges is that of learner needs. Usually adult learners who undertake to study a second language either want or need to learn that language. The situation for endangered languages is slightly different. Sometimes the learners are intrinsically interested in learning the language as part of their cultural heritage. They may be one or more generations removed from the community and may be economically more affluent than members of the EL community. Learners who wish to learn an EL for these reasons may wish to learn some words, phrases and cultural aspects of the language. They may be familiar with traditional academic settings of language learning and may have needs similar to mainstream language learners (e.g. explanations and vocabulary listings). However, the situation may be quite different for EL community members.

Roque (1996) states that the language is the most important part of cultural identity amongst the indigenous people in El Salvador. However, there are usually several factors that negatively impact the desire to learn the language. These include

- the psychological factors or mental attitudes towards the language (low social esteem),
- socio-political factors (for example, the 1932 massacre of the Pipils in El Salvador),
- economic circumstances,
- level of education,
- other learning priorities (e.g. English).

Most of these factors are common to ELs. EL community members may have neither the time nor the inclination to study generally, and may not consider learning their heritage language important. Many parents in an EL community would prefer that their children were able to speak the locally dominant major world language (e.g. Spanish in Latin America, English in North America). In the case of Nawat, there is the extra factor of fear that arose from the massacre of 1932. The majority of Pipil community members believe that there is no benefit to be gained from learning or speaking Nawat. Genaro Ramírez, my Nawat informant, is an exception to this. He has benefited greatly from his ability to speak Nawat and tries to impress on the younger members of the community the benefits of being able to speak Nawat.

Most language learners are motivated to study a language from either the intrinsic desire to learn the language or the benefits that may accrue from the ability to speak the language. In the case of ELs, this motivation does not inherently exist and must be fostered. One possible avenue of interest may be the dictionary element of the courseware. EL community members may be familiar with some words from their EL even if they do not speak the language. Borrowings from the EL into the now dominant language may be common for words for plants, animals and places and the learners could use this as a starting point into the courseware.

Another angle of interest may be the audio portion of the courseware. It is possible that EL community members may be familiar with spoken phrases in the EL and may enjoy actually hearing them "live" on

the computer. With most of the extremely ELs, it is probably that the native speakers recorded in the courseware are known to the learners. This gives the courseware an extra connection point to the potential learners.

Thus while most language courses assume that a learner need exists, the course developed aims to address a perceived lack of a need and aims to stimulate a desire to learn the language.

Syllabus Content

The next issue to be addressed is content. While ideas about content are mainly drawn from a summary of syllabi from Washington State University (Callaway, 1985), Cambridge University (Swan and Walter, 1984) and ALLC (Clark, 1987), some adaptations had to be made. For example, writing a letter of application for a job could be important for the major languages. However, in the case of extremely endangered languages, this would not be considered a priority learning item.

There is a fine line between omitting something that is not culturally relevant and not including something because no evidence of it has been found or documented in the target language. Time of day is one such example. This is an item that usually appears in the beginners' syllabus of the world's major languages. In the case of Nawat, while hours had been documented, I found no reference to minutes and considered omitting this item. However, Dr Lemus (personal communication) suggested that I talk to the native speakers and find out how they refer to time. His argument was that if a language is to have any chance of being used, it must update itself to modern life. Nawat for example, needs a word for computer. Given that it is polysynthetic language, this should not be an impossible task.

Other Issues

A new model for teaching ELs needs to be devised. Most ELs lack the materials, tradition and the general support that "ancient" languages have (Latin, Ancient Greek), and therefore community members and linguists may have to start the process of language documentation and description from scratch. A further complication may arise if the EL has structures not encountered in other documented languages. Lack of materials is a problem as it is useful to be able to refer a student to other texts (or web pages) with more information. If the EL has very few (or no) written materials available, it places a greater onus on the language learning courseware to fill the void. This means that the developer has to balance the need to provide extra information against the risk of not completing the courseware.

Template Syllabus

One of the aims is to encourage people to study the language. With this in mind, the course developed tries to adopt a light hearted approach to learning. The images used in the activities are of cartoon-like characters. There is no overt "grammar" section within a lesson. Instead the same information is presented in the explanation of each lesson. (A revision section, which reviews the "grammatical" content of the preceding four lessons has been added after a request for its addition during the second field trip to El Salvador).

Bearing in mind the items and issues discussed here, the basic syllabus for the template is as follows:

- there are twelve lessons,
- each lesson has three sections,
- each section has a conversation (with both audio and text versions), with a translation (either in English or Spanish),
- each section has an explanation and a vocabulary,
- each lesson has an end of lesson exercise, as well as an explanation and vocabulary summary for the lesson.

The syllabus is basically a product oriented one, which focuses on what the learner will be able to do as a result of instruction. A grammatical or speech theme is chosen for each lesson. Each lesson opens with a title, which conveys the overall theme of the lesson. Each section has its own title and image to put it in context. Within a lesson, the movement is from “simpler” to “slightly more difficult”. In terms of pacing, over-lengthy explanations are avoided. Only new items are explained (thus avoiding a long explanation section and unnecessary duplication of information). There is an end of lesson exercise, which draws on elements from each section.

Rosenshine and Stevens (1986) lists some elements involved in the structure of a language lesson. Some of these have been adopted in this course including:

- present new material in small steps, with student practice after each step,
- give clear and detailed instructions and explanations,
- provide systematic feedback and corrections.

Appendix B, p180 shows the full syllabus for the course. Lessons are sequenced on a need to know and increasing level of difficulty basis (although this is obviously language dependent). All the basic elements are covered. In terms of verbs, only the present tense is presented. As the aim of the template is to be flexible (see section 1.4, p7), obviously the syllabus can be modified as required.

6.6.2.3 Language Difficulty

The course is intended for absolute beginners and thus the degree of language difficulty is low. The themes chosen are themes that should be familiar to the learner (e.g. everyday greetings and saying your name). The course deals with concrete items and tries to avoid abstract themes, which would not be suitable for beginners.

Length is a factor that affects language difficulty. Each lesson contains three sections, with conversations, explanations, vocabulary and exercises. Each section has a short conversation, with simple clear phrases. The speed of the spoken part is normal or near normal. However, the facility to replay each phrase individually can help to counteract initial comprehension difficulties. The explanation part uses clear, informal language. It tries to avoid use of very technical, grammatical terms and overly long explanations. This is particularly important with a web based interface, as people tend to have less reading patience with online materials compared to printed materials.

Other factors that affect difficulty include the number of speakers, the length of the phrases and sentences, the attitude of the person speaking, and the topic (Brown and Yule, 1983). In this course, there are two speakers (the learner does not have to get used to many different voices – although this may not be totally desirable). They speak in a relaxed manner (and in this case, may actually be known to the learner). The ease of understanding of the task and particularity and generalizability (universal or stereotypical patterns) of the task also determine the level of difficulty. The topics are everyday topics that the learner can relate to, such as talking about what you do and describing things.

It is generally assumed that the receptive skills (listening and reading) are easier than the productive ones (speaking and writing). Most learners report this to be the case. The conversations are available in audio and text format. When the learners become more comfortable with the audio part, they can try to understand the audio part alone, without looking at the text (or the translation). This is an example of how the same text can be used at different levels of difficulty.

6.6.2.4 Program Difficulty

As the program is aimed at non-experienced computer users and people with a limited linguistic background, the aim is to minimise the level of program difficulty. This is done in several ways. Use is made of limited redundancy (use of the words and phrases of the conversations in the activities). Language output to the learner occurs in both written (Nawat with or without English or Spanish translation) and audio formats. Use is made of images to help contextualise the learning process. There is no time limit placed on the use of the system. The learner can spend as long as s/he wishes on a particular section, may listen to the audio part as often as desired and can do the activities as many times as s/he likes. This helps to minimise the pressure learners sometimes feel if there is a “time-limit” element involved.

Another factor in program difficulty is the complexity of program operation. The aim is to minimise the cognitive load associated with the operation of the program. To this end, the program aims to be easy to operate, with a consistent interface and easy manoeuvrability within the system. (Section 6.6.3.2 on the screen layout has more details on this topic). The cognitive difficulty of the tasks is low. The learner simply has to select the correct answer, match pairs of words or type in the correct answer. The tasks are all based on the lesson content and should be easy to understand. There are no great murder mysteries to solve.

While there is a suggested order to using the system, the learner has complete control over the program operation. The learner can leave the system when s/he wishes or can move to another part without censure. If the learner ends up somewhere unexpected, navigation aids make it easy to go back to a known location. All these factors help minimise the level of program difficulty.

6.6.2.5 Content

The content of the lessons reflects the perceived needs and interests of the students. When someone is learning a new language, it is natural to want to be able to say, “Hello, my name is X. I come from Y”. It is interesting to be able to describe someone or something (and maybe try to make some jokes).

While the template aims to be language neutral, obviously the Nawat language implementation contains language and culture specific elements. For example, many EL communities live in villages rather than big cities (as is the case of the Pipil people of El Salvador) and live close to nature. Thus, trees and mountains would be more prominent than skyscrapers in day-to-day conversation. Time references may be more often based on the activities of the sun (dawn, mid-day, twilight, night), rather than the strict hour, minute concept that is used in the west. See the syllabus in Appendix B, p180 for details.

6.6.2.6 Learning Style

Learning Styles/Learning Strategies

Given the great diversity of the human race, it is only natural to assume that a given target user group will contain a range of learning styles. Learning styles and strategies are covered in sections 2.3, p21 and 2.4, p23. The courseware aims to accommodate several learning styles, by providing information in both audio and text formats. Images are also used to appeal to those that are visually oriented.

The conversation of a lesson can be listened to without the text, with the text alone or with the text and a translation. The learner can look at the explanation before or after listening to the conversation. Similarly, the vocabulary can be studied before the lesson or after it using some guessing techniques. The activities can be avoided until later for those learners who like to be sure in their knowledge before attempting something. Alternatively, they can be attempted many times, if the learner has a “try it and see” approach to language learning.

There is an end of lesson review of the explanations and vocabulary used in each lesson to encourage the learner to review new material. Key phrases are repeated through the lessons to help the learner remember them. The conversations are about everyday topics and try to be as realistic as possible.

The dictionary items are arranged to give simple or more complete information. Those who just want to know the meaning of a word can use the basic form, while those that prefer more details can use the more complete form. Some people are audio learners and prefer to hear a word, rather than just read it. Each word in the dictionary has an audio link so that the learner can hear its correct pronunciation.

Some people do not like to see “technical” explanations, while others like to know the theory behind something. A revision section is available to those who have a theory based learning style. The learner is not pigeonholed in this course. Audio learners do not have to always follow an audio learning trail throughout the program. The flexibility of the system enables learners to decide how they want to learn and this may vary each time they use the system.

Target User Group

The target user group is the Pipil people of El Salvador. However, as no data is available on their language learning strategies and given the fact that they live and are educated within a dominant Hispanic culture, I will assume that as a group they share language learning strategies with the Hispanic majority. Thus, I will assume that the group have the following learning strategies: predicting, inferring (guessing

from context), avoiding details, working with others rather than working alone and basing judgements on personal relationships rather than logic (Oxford, 1996b). While my interaction with the Pipils has been too limited to have conclusive evidence as to whether the above holds true for them, some of the above strategies manifested themselves during my time in the National University of El Salvador (Oct 1998 – Aug 2000) - albeit as a computer science lecturer.

One of the stated aims of the project is to develop a generic framework for a CALL program for Endangered Languages. However, if I am to take into account the language learning strategies of a particular culture, it may be asked whether this is limiting the potential application. I believe that if the system is designed in a flexible (perhaps parameterised) manner, this should not lock the system into any particular language learning strategy. Also, there are many potential target languages in Latin America that could possibly share language learning strategies with the dominant Hispanic culture. For example, in El Salvador alone, there are two other (now extinct) indigenous languages (Cacaopera and Lenca-Poton). Many of the indigenous languages in Latin America are endangered.

The developed template aims to cater for a variety of learning types. The learner can use “recognition” of already learnt words and phrases to see if s/he understands the spoken (or written) conversation before looking at the explanation. Comprehension activities take place when the learner has to understand the question in each of the activities. In the exercise at the end of each lesson, the learner can either type in the answer to the question without assistance, or listen to the answer and then type it in. Either way, the student is forced to produce the target language. (The word ‘force’ here is relative, as the student can leave the system at any time and is never really “forced” to do anything).

6.6.2.7 Program Focus

Program Focus refers to the linguistic objective of the activity. As the template aims to produce a complete beginner's course, this includes:

- phonology,
- spelling,
- vocabulary,
- grammar.

Within this list, each part of the system has its own particular objective. For example, the lessons concentrate on vocabulary and grammar, while the alphabet section explains the phonology and spelling of the language (in simplified terms).

6.6.2.8 Learner Focus

Learner focus covers the skill area addressed by the courseware. In this case, the template covers three of the four principal areas: listening, reading and writing. The spoken skill is not part of the template. Learners can listen to the conversations (an unlimited number of times). In the activities, they can listen to the question before producing an answer. They can read the conversations (with or without a translation). Learners get the chance to produce the target language in the exercise at the end of each lesson.

6.6.2.9 Classroom Management

The template was developed with a single learner in mind. However, there is nothing in the format or design of the template that prevents it being used by a group of learners at once. Indeed, given the learning style preference of Hispanic students, it may well be the case that it will be used in a group setting. Furthermore, given the limited computing resources available in many EL communities, it is quite likely that a group learning situation may prove to be more popular.

6.6.2.10 Hardware and Program Considerations

The template will have a web-based interface, so that it can be run on a variety of platforms (although it is envisaged that the PC will be the most common platform). It will be available both on the Internet and as a CD for those who do not have access to the Internet. It will use both the keyboard and the mouse. Speakers will be desirable (to be able to hear the audio components of the system). However, the system is designed so that it can still be used even if no audio facilities are available.

Given that a web-based interface will be used, the implementation language of the system will be XML and XSL. Chapter 7 covers the technical design of the system in more detail.

6.6.3 Procedure Component

6.6.3.1 Activity Type

The course, being a tutor (rather than a tool), contains several types of activities. There is listening (via the audio element) and reading of the text. There are activities such as selecting from multiple choice lists, matching pairs of words and typing in the response to a question. All the activities were developed using Hot Potatoes software (Holmes and Arneil, 1998, 2001; Hot Potatoes, 2001). Half-baked software is a campus company of the University of Victoria, Canada that has produced software that can be used to create activities for language learning exercises (see section 7.3.8, p132 for more details).

6.6.3.2 Screen Layout

The area of screen design is pivotal in a project such as this. Much has been written about the whole area of GUIs (Graphical User Interfaces). A new field of Web Based Interfaces has emerged with the growth of the web. One could be easily overwhelmed by the wealth of information available on the topic. In this project, several basic principles were adopted to ensure that the finished product would be acceptable and not fall into some of the worst UI design errors.

Issues to consider in User Interface design:

1. Consistency: Is the User Interface consistent? Is a standard design being used?
2. Explanation of the rules: Is it easy to understand how the system should be used?
3. Navigation between screens: Is it easy to get from one screen to another?
4. Navigation within a screen: Is the screen designed in a way that is easy to follow?

5. Use of text: Is the text worded properly? Does the text contain any irrelevant information? Are the messages to the user positive?
6. Colour usage: Are the colours consistent? Is there too much colour?
7. Font usage: Are the fonts easy to read? Are there too many fonts? Is the font too big or too small?
8. Alignment of information: Is the information aligned correctly?
9. Crowded screens: Are the screens too crowded?
10. User control and freedom: Is it easy to leave any part of the system (if you go to somewhere by mistake)?
11. Error prevention: Have errors arisen with the system? Did the system handle the errors gracefully?
12. Error recognition, diagnosis and recovery: Does the system spot your errors? Does it help you recover from them?
13. Help and documentation: Is the system help useful? Is the online documentation useful?

The system endeavours to be consistent at all times. It aims to make it easy for the learner to navigate between screens, as it will have a menu bar on the left-hand side on the screens. A small number of colours are used and there are a limited number of font sizes. Care has been taken to ensure that screens are not too crowded. The learner has the freedom to leave any part of the system at any time.

There are also UI issues specific to web sites. Bunday (2000) lists some tips for building better web sites. A few of the more pertinent ones are listed here:

1. conserve bandwidth,
2. keep graphics small,
3. make your site navigable,
4. title every page with the name of the site,
5. do not change link colours.

Nielsen (1996) lists the following “Top Ten Mistakes” in Web Design

1. using frames,
2. gratuitous use of bleeding-edge technology,
3. scrolling text, marquees and constantly running animations,
4. complex URLs,
5. orphan pages,
6. long scrolling pages,
7. lack of navigation support,
8. non-standard link colours,
9. outdated information,
10. overly long download times.

Bearing these in mind, the system does not use frames or bleeding-edge technology. There is no scrolling text or animations (although it is accepted that animations may be useful in some circumstances). There are no URLs explicitly shown in the course (as all the links are internal). Care has been taken to minimise scrolling where possible, although it is very difficult to completely eliminate it. The graphics

files are small, as are the sound files. While no one UI will appeal to everyone, it is hoped that the simple, clear design of the course will make it acceptable and accessible to most.

6.6.3.3 Control

There is a suggested path through the course but the learner has complete control over the system. Given its web based interface, the learner can do things in a different order than the suggested one (audio, text, explanation, activity). The order of the lessons can be varied (although a sequential order would make most sense). The lessons have been created with an element of self-containment in mind, in the sense that they can be studied on their own, without having studied previous lessons. Obviously, vocabulary from previous lessons is used and structures from preceding lessons incorporated, but where possible, the aim is to be somewhat independent to cater for a more eclectic learning approach.

6.6.3.4 Judging of User Input

Hot Potatoes software (Hot Potatoes, 2001) is used for the activities. Three basic types of activities are used in the course, each with its own type of judging of user input. In the first type, the learner has to select the correct answer from a list of answers. There may be more than one correct answer. If there is more than one correct answer, this will be shown to the learner once one of the correct answers has been selected. In the matching exercise, there is only one correct answer for each item to be matched. In the exercise, where the learner has to type in a reply to the question, there may be more than one correct answer.

6.6.3.5 Feedback

The feedback in the activities and exercises is fairly simple. Generally, a translation is given of each option and sometimes an explanation of some salient feature is provided. Correct answers are marked with a smiley :-) and incorrect answers with an X (although these can be changed). The look and feel of the interface has been maintained. This includes providing the learner with a score to date and encouraging comments.

6.6.3.6 Help Options

The help options include a tutorial on how to use the courseware and language learning tips. The tutorial explains each of the main screens in the courseware and their function. It includes an image a sample screen to make it easier to understand. The language learning tips are to help the learner to become a more efficient learner.

6.6.4 Completed Courseware

The completed courseware includes:

- the language learning course,
- a tutorial on how to use the system,
- a textbook (for off-line learning),
- documentation about the system,

- other utilities such as a description of the alphabet, a dictionary, a grammar guide and some cultural information,
- installation manual,
- user manual,
- technical manual.

6.7 Template Evaluation Module

The courseware was evaluated by several groups of people, following the Hubbard (1996) guidelines. The operational description component was evaluated by evaluators both in Ireland and El Salvador. They evaluated the course in terms of screen layout, control options, and materials. Operational evaluation was ongoing in Ireland during template development to ensure that problems are detected at an early stage.

The learner-fit was evaluated both by an EL community leader (Genaro Ramírez) and by a linguistic anthropologist with experience in FL teaching and course development (Dr Lemus, Universidad de Don Bosco, Universidad de El Salvador). Both are Nawat speakers and were able to judge the content, its correctness and learner fit. They were able to evaluate the appropriateness and correctness of the language (grammar) explanations. They also determined if the language difficulty is at the right level given the learners' (beginners') proficiency.

While the courseware is aimed at an independent learning situation, it can also be used in an environment where a teacher is present. Therefore, the teacher fit aspect was also evaluated by potential teachers in El Salvador – the EL community leader and lecturers in both the Universidad de Don Bosco and the Universidad de El Salvador.

6.8 Template Implementation Module

The system was implemented (“deployed”) in several ways. Most importantly, it was available for use in the EL community. It was also accessible in the formal education system through the universities (Universidad de Don Bosco and Universidad de El Salvador). It was freely distributed to Salvadorians who wished to study the language (e.g. people one or more generations removed from the Pipil community).

Accessibility is very important when considering implementation. The courseware was provided on three different media in order to maximise its accessibility. There was an online version (Internet) (Ward, 2001), a CD version and a printed version. The Internet was accessible to those with Internet access, but who may not have access to their own computer. Internet café users and school students (both secondary and university) would fall into this group. Those with computer access but without Internet access were able to use the CD. Finally, those without computer access were able to use the printed version of the courseware. This is especially important when dealing with EL communities, as often computer access is limited or non-existent.

The ideal solution is that the learners can be shown how to use the system by a human tutor initially. They should then be able to use the system on their own and can refer to the online tutorial for help if required. It is envisaged that the system will then be used in an independent mode, without the presence of a teacher. Thus, the learner has complete control over time management.

The course has been designed for the individual learner, but there is no impediment to using it in a group setting. Indeed, given the reported learning preferences of Hispanics, this maybe a more natural learning forum in the case of the Nawat program. Given the lack of computer access, a group setting may be the most pragmatic approach. There are no inherent design features in the template which constrict its use to a single learner.

6.9 Summary

This chapter outlined the major design issues in the development of CALL courseware. The Methodological Framework described by Hubbard (1996) was used as the foundation for the presentation of the main modules and components for the development process. The Development, Evaluation and Implementation Modules were explained along with descriptions of their constituent elements. The realisation of each module in terms of this project was then described. The Development Module contains details of the syllabus of the CALL template, UI and other elements involved in the production of the courseware. Reference was also made to the evaluation of the system and its implementation.