Chapter 1  Project Introduction

1.1  Introduction
The aim of this project is to develop a template for the development of a CALL (Computer Assisted Language Learning) program for Endangered Languages (languages that are in danger of extinction). There are literally hundreds of CALL programs available today to teach a wide variety of human languages. However, most of these programs are for teaching the world’s Most Commonly Taught Languages (e.g. English, French, German, Spanish) and very few exist for Endangered Languages (ELs).

CALL is both under-researched and under-exploited in the context of ELs. CALL can be of benefit in many language learning contexts, including ELs. However, the EL context brings with it extra requirements and constraints that do not exist in the non-EL context. These include lack of speakers, lack of financial resources, development time issues, social status of the language, lack of computer knowledge, lack of linguistic resources and low social esteem of the EL community of the language.

The methodology adopted in the present project is to identify the generic components of a beginner’s CALL program from existing work on CALL programs. These components can then be adapted into a generic template to develop CALL programs for Endangered Languages. Given the difficulties that surround the development of a CALL program, the idea is to try to streamline the process for Endangered Languages in order to enable them to have their own CALL programs. While such a generic framework cannot hope to achieve the same standard as a particular language specific program would, the aim is to be able to produce a program that will cover the majority of the elements required for a beginner’s course while curtailing development effort and cost. This is important, as there is little money available for nor commercial interest in CALL programs for ELs.

This chapter introduces the area of CALL in the EL context. Section 1.2 outlines the background to the project. Section 1.3 provides an introduction to the field, highlighting the differences that exist compared to mainstream CALL. Section 1.4 explains what is meant by template in the context of the current project. It highlights the objectives of the project, along with the requirements and constraints that have to be borne in mind during the development process. The research methodology used in the project is outlined in section 1.5. Section 1.6 points out the interdisciplinary terminology discrepancies that arise when working on a project of this nature. A project chronology is presented in section 1.7 and includes a brief summary of the two field trips that were undertaken as part of the project. Section 1.8 provides an introduction to the remaining chapters in the thesis. Section 1.9 summarises the chapter.

1.2  Background to the Project
CALL in the EL context is an under-explored area. EL CALL faces many of the problems encountered by mainstream CALL, but further special constraints prevail when considering CALL in an EL context. There are technological, time and social status issues to consider that do not exist in the non-EL context. This project addresses the issues faced in the development of CALL courseware for ELs. A template was developed to create language learning courseware that takes into account the special circumstances of ELs. The template provides flexible data structures, a suggested syllabus for complete beginners and a
data processing engine (based on XML technologies) for the courseware production. The template was successfully used to develop multimodal courseware for Nawat (a language in El Salvador). Note that Nawat is known as Pipil in the linguistic literature. Nawat shares many of the characteristics of ELs (small number of mainly elderly speakers and low social status – see chapter 4, p61 on Endangered Languages).

An obvious and valid question is why not simply use an existing Authoring Tool in CALL development for ELs? Authoring Tools can be, and have successfully been, used to create CALL courseware and can meet some of the requirements of the EL situation. However, current Authoring Tools are often computing intensive and expensive, with requirements that may include large main memory, a fast machine and top of the range graphics capabilities – well outside what can be assumed to be available in a typical under-resourced EL context. The learning curve may be steep and may discourage rapid prototyping.

Standard Authoring Tools are generic and not specifically oriented at the production of CALL courseware. CALL-focused Authoring Tools often assume pedagogical knowledge on the part of the courseware developer (which may not be the case in the EL context). Furthermore, Authoring Tools may not support different modalities that are essential in the EL context to provide online, CD and printed versions of the courseware from the same source.

The template provided by this project is lean, free of charge and has minimal system requirements. It is straightforward to use and supports rapid prototyping (e.g. changes are easy to implement and are almost always immediately visible). It crucially supports different courseware modalities and is easy to amend.

The template provides a guideline syllabus that can be adapted as required. This is to help the courseware developer who may not have pedagogical knowledge. Another assumption in mainstream CALL is that the courseware developer has the linguistic knowledge needed to explain the items to be studied. In the EL context, this may not be the case. The template addresses this problem by allowing the courseware developer to provide currently known linguistic/grammatical information, which can be augmented if/when more becomes available. To avoid reinventing the wheel, the template adapted and integrated selected parts reverse engineered part of the Hot Potatoes software code (Hot Potatoes, 2001) for the activities and exercises. This enables the automatic generation, update and maintenance of interactive activities and the associated link structure using separate source XML data files at the press of a button, rather than having to create each exercise individually online (see section 7.3.8, p132 for more details).

With an Authoring Tool, the courseware data may be stored in a format that is not conducive to data sharing. This is a disadvantage in the EL situation where the CALL courseware can make a significant contribution to language documentation and provide a starting point for further documentation efforts. While Authoring Tools may be the solution for many mainstream CALL applications, they are often not the answer in the EL context.
An EL is often (but not always) the language of a poor community, with limited economic and educational resources. This implies that any CALL technology has to be simple, free of charge, easily available, maintainable and reusable. This often rules out “bleeding edge” technology (such as, for example, video). It forces clean design with the separation of the data and processing components to support sharing and reuse of resources.

There are special time considerations in the EL context. Speedy development, testing and deployment are vital, as otherwise the potential contributors to the system may be unavailable (due to health and age) before the software is developed. Rapid prototyping is essential as the lack of available documentation of the language means that the remaining speakers may be the only language checking resource available and the courseware may need several revisions before reaching an acceptable standard. Long turnaround times in courseware development and correction are not acceptable in an EL context.

A language will not survive if no one wants to speak it. Social status is important in the EL context – a language with low social status will struggle to survive. EL related projects need to be mercenary and participate in positive PR exercises on behalf of the EL (if this is in line with the wishes of the community). Modern, online, multimedia courseware for an EL can help promote the EL in a positive manner and demonstrate both to the EL community and the wider community that the EL can exist in the Internet age and is not just a relic of olden times and “for the old people”.

CALL for ELs should be based on sound pedagogical principles. The particular constraints posed by ELs, however, often prevent incorporation of some of the more cutting edge CALL and experimental pedagogical ideas. Thus this project instead adheres to generally accepted CALL good practices (such as they exist). Learner autonomy is fostered and different learning styles are catered for. The data presentation follows recommended web-page design and Human Computer Interaction (HCI) guidelines (see section 6.6.3.2, p111). The underlying philosophy is that for ELs it is important to base the developed courseware on what is known to be effective rather than “pushing the boat out” and experimenting with new ideas.

Evaluation is an important part of the CALL (and software) development cycle. While mainstream CALL applications may be able to carry out (large-scale) quantitative and qualitative evaluations, this may not always be an immediate option in the EL context. However, evaluations were carried out at various stages of the template development. Special attention was paid to the evaluation of the Nawat courseware, both in Ireland and El Salvador. The feedback gained was incorporated into modified versions of the system.

This project considers the needs of four different user groups. Firstly, there is the language learner group. This is primarily made up of people who are members of the EL community and wish to learn their heritage language. Within this group we may differentiate a subgroup of people one or more generations removed from the EL community who wish to learn the language of their ancestors. This subgroup often lives in more favourable economic circumstances and in contrast to the first group, this group is more likely to have access to computing resources.
The second group consists of those who wish to study the language from an academic point of view. This group is mainly interested in linguistics and language documentation. It may include both local and international linguistic scholars, with the caveat that the EL community members can control who studies their language if this is an issue for the community in question. For example, some North American tribes do not want those that they consider outsiders to learn their language.

User groups three and four are more aptly referred to as courseware developers. The third group is made up of those who wish to create language learning courseware for the EL in question. The courseware can be augmented as material becomes available. This group is likely to add material and cultural information to the courseware. For example, people at the Universidad de Don Bosco and the Universidad de El Salvador would fall into this group.

The fourth group consists of courseware developers who can use the template to create courseware for other ELs. They will reuse the courseware structure and processing engine and start off with an empty shell. Their task is to provide the courseware for their EL. They can use the guideline syllabus as a starting point and modify it as required to adapt it to their own specific cultural situation.

One of the aims of the project is to avoid reinventing the wheel. EL communities should not have to start from scratch when developing CALL courseware. They should be able to draw on the experience of mainstream CALL. Given the limited resources available, it is important to reuse those resources that are available. The template provides three kinds of reuse:

- data reuse,
- processing engine reuse,
- courseware structure reuse.

For example, it is not feasible for the limited numbers of technically knowledgeable people working with ELs to develop a CALL template from scratch for the language(s) that they work with – many languages will have disappeared before their “own” template is developed.

The reusability of the courseware extends to different presentation of the same data. Thus, the system presents the courseware using different modalities, including text and audio forms. It also uses the courseware in different contexts. For example, phrases from the conversations are repeated in the activities and exercises. Another example is the dictionary, which uses words and audio information from the conversations.

There are also pedagogical reasons for the reuse of courseware. For example, repeated exposure to the words can increase learner familiarity and thus retention. This can then lead to more positive outcomes in the activities and exercises, which in turn can increase learner confidence. This is especially important in the EL context, where learner confidence may be especially low.
The reusability of the courseware structure encourages courseware developers to use the system as their familiarity with it increases. The learning curve for the courseware structure is not steep and a clear and consistent format is used throughout the various components of the courseware structure. This is important in the EL context as it is envisaged that courseware developers will not be expert computer users.

Due to the special constraints that prevail in the EL context, it is imperative that good software design principles are adhered to in the development of the system. This implies that there is a clear separation between data and the processing component. XML technologies were adopted as the underlying technology as they have many desirable characteristics for a project such as this one. The separation of data and processing is an inherent feature of XML design. Data and processing engine reusability enhance the reusability aspects of the system. The rapid prototyping available with XML technologies fosters a willingness to correct and enhance courseware content. XML technologies enable the production of software that can be recycled, which is one of the fundamental aims of this project. They permit the production of CALL materials in multiple modalities. In short, XML technologies with their clean, clear, configurable, Unicode enabled, multimodal software provide the flexible and adaptable software backbone for this project (see chapter 7, p116 for more information on XML technologies).

While some might question the wisdom of developing CALL courseware for ELs given their perilous state (e.g. lack of speakers, lack of interested learners and lack of computer access), it is precisely for these reasons that CALL courseware is important for ELs. Without CALL (or some other language learning program), the number of speakers is not going to increase. Therefore, it is vital that the courseware is produced while the remaining speakers are still capable of contributing to such a project. The motivational aspects of CALL may encourage otherwise uninterested learners to study the language. Current lack of computer access should not be held up as a reason for not doing EL CALL. In the interim period, the courseware can be made available in other modalities (e.g. the printed form). Furthermore, access to computing resources, while not taken for granted in the immediate EL community, is often more likely for people one or two generations removed from the original EL community who wish to learn the language of their ancestors.

One aspect of EL CALL that is not a consideration in mainstream CALL is the potential positive social impact of the production of CALL materials. While this may not hold for all ELs (e.g. for EL communities that wish to limit outside knowledge of their language), my experience with the publication of the Nawat CALL courseware in El Salvador and its reception in the national press and television (Appendix G, p190) points the way for a more positive portrayal of the language than was previously the case. The courseware production can also be considered a language documentation exercise, which is especially beneficial in the EL context.

CALL in the EL context faces some issues that are not normally a concern in mainstream CALL. For example, the remaining speakers may not have full linguistic competence in the language and this may have to be taken into consideration. The syllabus may have to be modified to reflect this. The data gathering process must be well planned, as access to speakers may be limited. Anthropological skills are
required on top of technical and pedagogical skills and preferably blended with some relevant ethnic knowledge. While cultural awareness is an important aspect of language learning, it is extremely important in the production of language learning materials in the EL context.

In summary, this project addresses the very real problems associated with the development of CALL courseware in the EL context. EL CALL has to contend with challenges not usually encountered or researched in mainstream CALL. The template for CALL courseware for ELs developed in this project provides a simple yet effective mechanism for the production of multimodal language learning materials. This was demonstrated by the Nawat courseware that was developed using the template.

1.3 Background to CALL and Endangered Languages

This thesis addresses the issues surrounding the development of CALL materials for ELs. CALL materials are considered useful with or without the presence of a teacher. While the teacher-learner relationship is of special importance, it is not the only one in the language learning context. This is important for ELs, as teacher availability cannot be assumed. This is because the few remaining speakers may not be physically well enough to teach, may not have the time to teach or may not have the skills required to teach. Therefore, the development of CALL materials for ELs can help to overcome one of the problems faced by the potential EL learner.

It may be argued that CALL templates already exist, that there is a variety of authoring tools available, which can be used to produce CALL materials and that the world does not need yet another template. Granted, many utilities do exist which aid the development of CALL materials. Indeed, for Most Commonly Taught Languages (MCTLs) and Less Commonly Taught Languages (LCTLs), yet another template may not be a wise route to follow. However, to date neither the CALL development needs of EL communities have been addressed nor current CALL best practice and knowledge applied in the EL context.

CALL for ELs - differences

In the case of ELs, different requirements and constraints exist and often these are not dealt with in mainstream CALL. CALL development is a non-trivial task and requires pedagogical, linguistic and technological knowledge and expertise. If it is challenging in a non-EL context, it is even more so in an EL context. Technical or linguistic knowledge and expertise may be limited or non-existent. Courseware resources (including written texts and audio recordings) and availability of native speakers may be limited. These limitations place an extra burden on the development of CALL materials in an EL context. Further differences also exist. However difficult CALL practitioners perceive their financial situation, it usually pales in comparison to the financial difficulties experienced by the EL community.

One area that is under-researched in CALL is the area of syllabus design for ELs. Within this area, there are several issues to consider, including user profile and content. It is often assumed that the learner is motivated to learn a language when s/he undertakes to study it. The learner may have to learn the language to pass an exam or to integrate more into a particular culture. In the case of ELs, the learner motivation is quite different and the “usual” language learner motivational reasons do not exist (indeed,
they may have to be fostered). Therefore, some assumptions about learner motivation in the language learning (CALL) context must be reconsidered.

Furthermore, certain elements that usually appear in a language learning syllabus may seem out of place on an EL syllabus. For example, writing a job application to a prospective employer would not be a priority learning item (as the EL is usually not the language of business or usual communication). This is not to imply that lessons should not be developed on such topics – only that consideration must be given to the realities of the EL environment so that a syllabus covers those items that are more relevant to the (current) EL situation.

Brown (1994) refers to the importance of intercultural awareness, and states that people who understand different worldviews usually adopt a positive attitude towards cross-cultural differences. While this point was made in the non-EL context, it is interesting to consider it in the EL context. Speakers of the dominant language in an area where the EL was once the dominant language may be from one of three groups. They may be from a different cultural group, a mixed cultural group or from the EL cultural group. Often, but not always, this group have a negative image of the EL itself and/or the EL community. It may just be possible that promoting awareness of an EL (and indirectly its culture) could help counteract some of the negative exposure of and attitudes to the language.

One question that may arise regarding CALL and ELs is why CALL materials should be developed for ELs if the EL community does not have access to a computer (which is often the case)? Some of the major benefits that the development that such material can bring to the community includes raised esteem within and outside the community, improved social status of the language and language documentation. It can also act as a trigger for greater language awareness within and outside the community. Moreover, just because the community currently does not have access to a computer, this does not mean that it will be without computer access forever. EL communities may have future computer access and will then be able to use the CALL materials. In the meantime, it is important to provide the information in printed form to enable the EL community to access the courseware immediately. Given the normal development times for CALL materials and the perilous state of some ELs, it is imperative that development takes place now while the last few remaining speakers are alive.

An even more basic question is why develop CALL materials for ELs at all. If the language is about to disappear, why bother trying to teach it anyway? While there will always be people who doubt the usefulness and point of EL documentation/maintenance/revival, it has both scientific and cultural merit. This is discussed in more detail in chapter 4. The aim of the project is to encapsulate current best practise of CALL into the template, while at the same time keeping in mind the constraints and special needs of ELs.

1.4 Template Objectives, Requirements and Constraints

1.4.1 The Word ‘template’ in the Context of this Project

In the present project, the term template refers to the whole project infrastructure. It includes the courseware (language data, including text, audio and image materials) structure, the processing engine of
the system and the linguistic resources. From a software engineering perspective, the courseware structure is the data structure, while the processing engine contains the algorithms of the project. The template is the framework that encompasses both high-level design elements (syllabus content, lesson plans, screen and design) and low level elements (XML data files). While there are tools which address specific elements of the CALL design and development process (e.g. authoring tools), it is hard to find a tool which incorporates both high and low level elements that meets the demands and constraints particular to ELs. The present project endeavours to develop such a tool. Chapter 7 explains the template in more detail.

1.4.2 Project Objectives

To Develop a Template

The main object of the project is to develop a template to enable the development of CALL courseware for Endangered Languages. Templates exist for the development of CALL programs, but they are generally developed with the world’s MCTLs in mind (English, French, German and Spanish). Often these can also be used for other LCTLs. They often make assumptions such as the fact that

- a written version of the language exists,
- there is a standard dialect,
- corpus material is available,
- there are language, education and (sometimes) computer experts available to help develop the language courseware.

This is often not the case for Endangered Languages (ELs). Thus, the aim of the project is to develop a template that takes these issues into consideration to enable EL communities to develop language learning courseware for their language. Given the limited money and resources available to EL communities, it is imperative that development costs are curtailed. This is achieved by identifying successful elements from mainstream CALL and incorporating them into the template design.

To Avoid “reinventing the wheel”

A further important aim within this objective is to avoid “reinventing the wheel”. It does not make sense for an EL community to invest a lot of time and energy into the development of a generic tool for the creation of language learning software (even if the resources were available). It would be of great benefit if an EL community could use a generic tool to create courseware for its own language, freeing up resources (e.g. time and money) for further pressing linguistic issues (e.g. language documentation). The template approach adopted in the present thesis aims at providing such a tool.

One of the main aims behind Authoring Tools is to avoid “reinventing the wheel”. Thus, the project could be accused of doing what it seeks to avoid, namely that it is “reinventing the wheel”, given that it appears to replicate the functionality of Authoring Tools. While, the template shares some of the philosophies behind Authoring Tools, it does, however, focus on the specific needs and constraints of ELs. This is a novel contribution of this project.
To Reuse Resources
One of the advantages of using a template is the ability to reuse it. The template can be used to develop language learning courseware for more than one language or language level. The template aims to provide three types of reuse:
1. reuse of the processing engine,
2. reuse of the courseware structure,
3. reuse of the linguistic resources.

Reuse of the processing engine and courseware structure means that the same software can be used to produce many lessons in a given language. The processing engine works on specific structures to produce the desired output. The courseware structure defines how the data is stored in the system. For example, by defining a section file structure, the courseware developer can create as many sections as desired so long as the specified structure is adhered to.

Processing engine and courseware structure reuse also implies that the template can be used for different languages. Processing engine and courseware structure reuse are important in any CALL development environment, but are not always present. Sometimes the courseware and processing engine that has been developed is hard-wired and cannot be easily separated and changed. Furthermore, it may be language specific and may not be used for other languages. The template aims to avoid this problem and design of the processing engine and courseware structure incorporates reuse objectives right from the start.

The reuse of linguistic resources is particularly important in the EL context. In the non-EL context, there is ample access to native speakers and linguistic resources in general. However, in the EL context, the opposite is true – native speakers are scarce and linguistic resources are often very limited. This means that it is useful to be able to reuse linguistic resources during the development of the language learning courseware. This involves reusing phrases and recordings of the conversations in other parts of the courseware (e.g. in the activities and exercises), as well as the reuse of the material in a different medium (e.g. in printed form).

While it might be pedagogically preferable to have greater language diversity, it may not be entirely feasible in the EL context. There may be issues with the free time available to native speakers which can limit the time available to prepare and record different ways of saying the same thing (see Constraints further on in this section). The unavailability of known linguistic alternatives due to the endangered state of the language (e.g. no one remembers how to say something in more than one way) may limit the scope for providing more diverse language input to the learner. Therefore, the ability to reuse linguistic resources is welcome and pragmatically desirable in the EL context.

To Document a Language
A template that encompasses language documentation and CALL development has the potential to have a positive impact on the social status of an EL. Generally, ELs have a low social status (discussed further in chapter 4), which is not conducive to language survival. Putting a language online and proving it can be part of the digital age, can potentially raise its social status. EL maintenance and documentation
projects can use positive publicity to raise the profile of the language both within the EL community and
the wider community.

The development of the CALL tutorial and the fact that native speakers speak the recorded conversations
in the tutorials means that linguistic material will be available for future reference online. Whatever
chance a language has of surviving, it is virtually impossible to do so if linguistic materials are not
available. Furthermore, there is a movement within the linguistic community to develop a standard for
the storing and maintenance of linguistic data (LEW, 2000; LEW 2001).

The template aims to archive and preserve the language in a format that will not be obsolete when newer
technologies and standards materialise. It is built using XML technologies which provide flexibility and
scope for adaptation. Furthermore, XML technologies are being considered as a mechanism for the
storage, maintenance and study of linguistic data and thus the template will be able to integrate with these
new standards when they come into being.

To Put Nawat Online
Another objective is to make the Nawat language of El Salvador available to a wider community on the
computer. Many members of the Pipil community (see chapter 5, p75) have an inferiority complex about
Nawat in comparison to Spanish, which is the locally dominant major language. Younger members of the
community who are educated in Spanish consider that Nawat does not belong in the modern world (being
a “useless language of the old people”). Putting Nawat on the computer may help to change this
perception. A further objective is to provide some form of (online) Nawat language documentation.
Currently there is no online language information available on Nawat. The development of CALL
materials for Nawat can help put Nawat documentation online.

1.4.3 Requirements
The template will have to be modifiable, so that is easy to correct, add and remove information. Not only
is this a basic requirement of any CALL template, it is even more important when dealing with ELs. This
is because the possibility of errors is higher when developing courseware for ELs. There are often fewer
literate speakers of the language to check the contents of the courseware and issues may arise due to the
fact that the language may not be used daily by the speakers. It is obviously important to be able to add
information, as the development of the courseware should be viewed as a continuous process, not as a
one-off task. Language lessons can be developed for different levels. Cultural information can be added
as more information becomes available.

The template should be easy to use. The envisaged courseware developers will generally not be computer
specialists. It is important that they only have to work with the language data and that they do not have to
worry about the technical side. The courseware should be easy to maintain. Necessary maintenance will
only be carried out if the courseware developers would find it easy to correct or modify data – if it is too
cumbersome, the maintenance will be left undone. It is also important to be able to contract out the
compilation of courseware data to non-technical fieldworkers and the technical resources available in any
EL community will be limited. There is a further advantage to be gained from enabling non-technical
fieldworkers to collect data – it can foster community involvement in the project and increases community ownership and may increase community participation.

Furthermore, the template should produce language learning courseware that is easy to use and which encourages learners to use it. It should not compromise on the use of the CALL technology, just because it is for an EL. As much as possible, the same principles that guide the development of CALL applications for other languages should be applied. All the pedagogical, linguistic and technological knowledge that should be combined in the production of CALL software should be used in the development of the template.

1.4.4 Constraints

The project is developed with ELs in mind and so certain technological, design and time constraints must be taken into consideration (see chapter 4, p61 for a fuller discussion of ELs). The technical and financial resources available to EL communities are limited. Therefore, the template must aim for the following profile:

- be simple to use,
- be free of charge,
- be easily available and maintainable.

This rules out leading (and “bleeding”) edge technology. It excludes (at present) the use of video technology. It implies the need for a clean design process, with a clear separation of data and processing components.

The time constraint is one that is unique within CALL, both at the macro and micro levels. At the macro level, EL communities simply do not have the luxury (however desirable it may be) of devoting several years to the development of CALL and language documentation projects. A pragmatic approach is required – one that can combine language documentation and the development of CALL materials. A template which allows speedy development, testing and deployment is vital – otherwise the language may have no speakers left alive.

At the micro level, it must be borne in mind that remaining speakers of an EL may not have much free time to work with a CALL developer. An EL speaker is generally a person of limited economic resources and may not have the luxury of “spare time” to work on other, non-essential tasks. Obviously, there are exceptions and workarounds to this scenario, but there is usually a constraint of native speaker/informant time. This implies that optimal use should be made of informant time. For example, the time could be spent focussing on the “essential” linguistic items to be taught and the “extra” items covered only if time permits. (Note that what is considered “essential” and “extra” will be different for each language).

A further time constraint at the micro level is the length of time that the native speaker can work on CALL development at any one time. While many CALL developers for non-ELs are accustomed to working in an office and dealing with written documentation for long periods of time, the same may not be true for native speakers of ELs. The pattern of their working day may be very different and this has to
be borne in mind when developing CALL materials for ELs. It cannot be assumed that native speakers will be comfortable working for long stretches of time, recording conversations for language learning courseware. Thus, both macro and micro time management constraints prevail in the EL context. While these constraints may appear restricting, they do force the use of good practice. This includes:

- clean design,
- a clear separation between data and processing,
- a minimal design.

These elements are conducive to the development of a product that can be recycled, which is the aim of the template.

1.5 Research Methodology

Any CALL project is an interdisciplinary project. The present project draws on procedures from the domains of CALL, Endangered Languages and software engineering. It is based on the CALL Methodological Framework proposed by Hubbard (1996 - see chapter 6, p93 for details). Attention is paid to the importance of learner autonomy and provision for different learning styles and strategies. User interface design, especially with regard to web pages, is carefully considered.

The project uses language syllabus research to identify generic components that can be used in the development of a CALL program. At the absolute beginner level, there are common items that the learner needs/wants to learn. Topics such as greetings, simple expressions and the basic structure of the language recur in almost all CALL programs aimed at the absolute beginner. The template developed in the present thesis uses common items found in syllabi of other ab initio courses and makes adaptations where required for ELs.

Research into ELs is reviewed. The project attempts to deal with the special problems that ELs face in terms of CALL development. These include lack of computer and pedagogical expertise, low-level of education of potential course developers and low literacy rates within the community (CALL users).

Standard software development techniques from the software engineering domain are used in the development of the project. A combination of two common software development lifecycle methodologies (“waterfall” model and evolutionary development (Sommerville, 1996)) is used (see chapter 6, p93 for more details). The author’s experience with the development of generic tools in the commercial world is brought to bear on the project. While one of the aims was to avoid reinventing the wheel for the CALL developer, a similar philosophy was used within the development of the template.

The development of language learning courseware cannot occur in isolation. Knowledge of the target language to be taught and the language through which it will be taught are essential. Knowledge of what works (and what does not) in terms of language learning are important. In addition to CALL and
pedagogical literature, the personal experience of the author as a language learner in different contexts and observing the learning styles and strategies of others helped shape the developed courseware.¹

There has been a renewed interest in the international linguistic community to use modern technology in the preservation of endangered languages (Crowhurst, 2000). Many languages on the verge of extinction will disappear before any part of the language is preserved. This project is informed by the research findings of the language preservation movement and proposals for storing of linguistic materials.

1.6 Interdisciplinary Terminology Discrepancies
Any CALL project is by its very nature interdisciplinary and terminology discrepancies can arise between the different disciplines. Different disciplines use the same terminology to refer to different things. This can obviously lead to confusion. This project encounters this problem with the terms “design” and “implementation”. Within the CALL domain, “design” refers to the overall design of the courseware, the pedagogical objectives and methodology and courseware presentation. “Implementation” refers to how the courseware is deployed.

Within the field of software engineering, while design covers the overall design of the system, it can also encompass the technical design. “Implementation” is generally understood to mean “implementing” the technical design; in other words, converting the design into software. Chapter 6 covers the design in the CALL sense. Chapter 7, the chapter on implementation, covers the technical design, the software implementation, the evaluation and the CALL implementation of the courseware.

Note also that “evaluation” means different things in CALL and software engineering. In CALL, it means evaluation of the final software product. In software engineering, it can mean evaluation of the software itself as well as evaluation of the produced software.

1.7 Project Chronology
This project started at the end of October 2000 and finished one year later at the end of October 2001. Figure 1.1 shows a (simplified) chronology for the project.

1.7.1 Research
The first two months of the project were spent on researching CALL literature, EL literature, XML technology and the study of Nawat. The field of CALL is an active research area and therefore there was plenty of material available. XML technologies are still in the relatively early stages of development, although some components are more stable than others. Documentation on Nawat was much more difficult to find. Fortunately, the “The Pipil language of El Salvador” by Campbell (1985) was an excellent reference book on Pipil (as Nawat is known in the linguistic literature – see section 5.2, p75 for more details).

¹ Irish – secondary school, formal; French – secondary school, formal and informal thereafter; Japanese – formal and through living in Japan; Spanish – formal and through living in El Salvador; Nawat – mainly self-taught.
1.7.2 Field Trip 1
The next two months were spent in El Salvador (field trip 1 – mid-December 2000 – beginning of February 2001). On this field trip, I gathered all the available documentation on Nawat. Gallo Tibero (Universidad de El Salvador) was especially helpful in this regard. Dr Lemus (Universidad de Don Bosco, Universidad de El Salvador) was my prime collaborator in El Salvador. He is a linguist, anthropologist, language teacher and Nawat speaker. I was very fortunate in having such a valuable contact. It was through him I was able to make contact with two competent Nawat speakers (Genaro Ramírez and Paula López).

I spent my time in El Salvador researching Nawat, designing the syllabus, establishing contact with the Nawat speakers, and planning and carrying out the recordings of the lessons. Although it was my first field trip in this type of setting, I did have the benefit of having previously lived in El Salvador for two years (1998 – 2000). I had some understanding of the environment in which I would work, although there is obviously a big difference between working in the regional campus of the national university (Universidad de El Salvador, in San Vicente) teaching computer science courses and doing linguistic fieldwork in a rural village in western El Salvador (Santo Domingo de Guzmán). Figure 1.2 shows a map of El Salvador, with Santo Domingo de Guzmán marked out just north of Sonsonate. Note that Sonsonate is/was the centre of the Nawat speaking region of El Salvador. Work was interrupted by a
devastating earthquake (6.8 on the Richter scale) in mid-January 2001. Almost 1000 people lost their lives while many thousands were made homeless. Nevertheless, I was able to complete my work before leaving El Salvador at the beginning of February 2001.

![Figure 1.2 Map of El Salvador](image)

### 1.7.3 Development in Ireland

Upon my return to Ireland, I set about implementing a mini-prototype of the system using XML technologies, to test the feasibility of the technology. I also continued my research into CALL and Endangered Languages. By mid-March, I had a mini-prototype developed. The general structure of the system emerged and was expanded as my technical understanding of XML technologies advanced. In parallel with this, the sound files were copied from mini-disk and edited into individual conversations and phrases.

An initial version of the system was tested with a language learner. The first version of the system was based on English as the language of instruction in order to be able to test it with learners in Ireland. This proved to be a very useful experience as it highlighted a few glitches in the system but also indicated that the general thrust of the project seemed to be correct. Subsequent informal learner evaluations took place during the April-May period.

An English version of the system was tested by a final year computational linguistics student at DCU with CALL experience. She was able to evaluate the system and make some suggestions for improvement. A Spanish version of the system was created in the middle of June. I worked on several chapters of the dissertation in parallel with the courseware development.

### 1.7.4 Field Trip 2

In July 2001, I returned to El Salvador for my second field trip. This trip involved checking the overall courseware and the Nawat and Spanish language portions of the courseware. Once the contents had been revised by native speakers, I amended the courseware where required. Suggestion about the printed
version of the courseware were incorporated into the final product. I gave several workshops about the Nawat language learning courseware (see Appendix A, p179 for details). It was very well received and there was more interest expressed that I had initially anticipated. I did a television interview, a radio interview and there was an article in a national newspaper (included in Appendix G, p190) and one in the newsletter of the Universidad de El Salvador. This field trip was quite intense, as is usually the case when the “final version” is released.

1.7.5 Project Wrap-up
I returned to Ireland in August 2001, where I continued to work on this document. I gave a presentation at the Linguistic Symposium on Endangered Languages in Finland (29 August – 1 September 2001). September was mainly spent writing the thesis, along with the User Manual and Technical Manual. The User Manual was pilot tested by a non-expert computer user and the necessary changes made where required.

1.8 Organisation of this Thesis
This section explains the organisation of the rest of the document. Chapter 2 reviews Computer Assisted Instruction (CAI). It considers learning styles and strategies and the issue of learner autonomy. Chapter 3 introduces CALL and discusses its benefits and limitations. Chapter 4 reviews Endangered Languages, issues of language maintenance and CALL as it relates to ELs. Chapter 5 outlines the Nawat (Pipil) language of El Salvador, the language for which the courseware was developed. Chapter 6 discusses the design of the system from a CALL design perspective. Chapter 7 describes the software design methodology used in the development of the project, the system structure and the completed courseware. Chapter 8 describes the testing and evaluation of the project. Chapter 9 summarises the difficulties encountered, the conclusions and suggestions for future work.

1.9 Summary
This chapter explained the purpose of the project, which was to create a template for a CALL program for Endangered Languages. It presented the background to CALL in the EL context. The term “template” was defined in the context of this project, which encapsulates not only the courseware structure of the lessons but also the processing engine of the system. The objectives (template development, CALL material development and language documentation) were stated, along with the requirements (ease of use, modifiability and the production of a CALL program) and the constraints (both technological and time based). The interdisciplinary research methodology used in the project was presented. The methodology draws on CALL, EL and Software Engineering domains. Interdisciplinary terminology discrepancies were highlighted (e.g. what is meant by the words “design” and “implementation”). The project chronology was presented, with a brief summary of the two field trips carried out as part of the project. Finally, an overview of the organisation of the thesis was provided, with a brief resume of each chapter.