Evaluating IMMEDIATE: The Long March to an E-Learning Appliance

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ABSTRACT
In this paper we describe the many evaluations that have been required to ensure that the learning appliance, IMMEDIATE, provides, in an accessible manner, the required functionality for supporting distance teaching. An iterate and revise approach was followed as IMMEDIATE grew from a proof of concept prototype to a full working system. A primary goal has been for users to find the interface easy to use, supporting their educational endeavors. There have been many challenges over the years: technical, educational, practical and cultural. These issues are discussed here.

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Interface Evaluation, IMMEDIATE, e-Learning

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms
Human Factors.

INTRODUCTION
The IMMEDIATE (Integrating MultiMEdia in a DiStAnce learning and TEaching environment) learning appliance was developed as a generic teaching tool for distance learning in a university context [6]. The student module enables the learning material to be delivered in a variety of forms – individual and collaborative, active and passive, formal and informal – similar to the multidimensional learning of a university institution. The motivation for developing IMMEDIATE with its context sensitive help was to build a system more widely accessible and usable to students than web-based Learning Management systems. It can even be run from a student’s memory stick. This paper reports on the many evaluations of the student module that have been carried out and discusses the various challenges that have been faced: practical, educational and cultural.

BACKGROUND
This project commenced several years ago with the aim of developing software for distance learning in order to narrow the digital divide in education and to enhance all distance students’ learning experiences. The learning appliance was envisioned as a low bandwidth tool that would provide a simplified, specialised e-learning environment which would work with or without an Internet connection. The goal was to provide a system that was easy to use and invisible in line with Don Norman’s view that technology is a friend when it is unobtrusive [13]. IMMEDIATE is a learning appliance, which allows the educator to present information in many different ways following their own pedagogical style; a complete course can be delivered. The philosophy which underpins this approach is as follows:

- A special purpose tool (i.e. one geared to teaching) can provide a simpler environment than a general purpose one. There is the seamless conflation of operating system, browser and application functionality through a specialised, simplified interface.
- The distance learner is viewed as the primary user rather than the educator. The focus is on ways of supporting the student in a way that complements rather than replaces the roles of the teacher.
- The educator can deliver a coherent course based around the modes which they see as suitable for
their discipline. There are also generic components for any course such as course guide, lecture notes, assignments and self-assessment exercises.

- Student can adapt the environment as they wish – for example, determining how (in what mode) they will study a particular topic and when.
- The student can track their progress through the course and receive context-sensitive learning support. Learning assistance is provided through an integrated system of electronic messages, audio communication, collaborative work groups and online help built upon a replicated SQL-compliant database.
- The tool which can be installed on a memory stick works in both on-line and off-line environments. When on-line, material can be updated and students can communicate with each other. In off-line mode, students can work alone on specific tasks.

Essentially, an iterative prototyping approach (evaluate and revise) was used in the development of IMMEDIATE [19]. This is an approach advocated for the development of novel applications. One area which seemed particularly appropriate for testing the functionality of IMMEDIATE was the distance teaching of foreign languages. Otto and Pusack observe that [15, p787] with second language teaching “we are almost certainly moving towards new models of teaching that rely heavily on technology. Working with such models, teachers orchestrate and mentor students’ language learning, not so much from centre stage but from behind the scenes, or even at a distance.” Technology should support a modular approach to the teaching of language, e.g. “Grammar, Vocabulary, Reading, Writing, Listening, Speaking and Culture.”[8, p769]. It is not the delivery of materials per se, though, that is important according to White [23] but supporting the interaction between the learner and the learning context. Garrett [3] also notes that “Simply providing students with web links does not of itself constitute Computer-Assisted Language Learning.” She emphasises that computer-assisted language learning should not be limited to just the communicative aspect but support students who do not want to focus on spoken language but other aspects e.g. reading. Essentially, educational software should support various pedagogies both social constructivist and cognitive foundation-building approach. Whatever approach is followed in distance-based teaching, there should be explicit support for students learning in an unfamiliar setting. Learner support is seen by White as “an explicit feature of quality” [23].

Both educational and interface aspects of educational software for distance learning have to be taken into account as Smulders [21] recognized (Table 1) but educators as well as the learners have their goals. The key questions that needed answering were as follows:

1. Given the prioritisation of the user, would students be able to easily use the interface and find it educationally acceptable (i.e. provides the required functionality)?
2. Would the educator find that the system provides them with the appropriate functionality to deliver a course (again there are the HCI and the educational perspectives)?

<table>
<thead>
<tr>
<th>Learner</th>
<th>Computer User</th>
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<tbody>
<tr>
<td>Content</td>
<td>Form</td>
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<tr>
<td>Recall</td>
<td>Recognition</td>
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<tr>
<td>Reflection</td>
<td>Intuition</td>
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<tr>
<td>Academic Rigour</td>
<td>Ease of use</td>
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<tr>
<td>Stop and think</td>
<td>Point and click</td>
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<tr>
<td>Soak it up</td>
<td>Skimming</td>
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<td>Deep reading</td>
<td>Scanning</td>
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<td>Problem solving</td>
<td>Problem avoidance</td>
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<td>Critical thinking</td>
<td>Inquisitive browsing</td>
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<tr>
<td>Touch</td>
<td>Delicate</td>
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<tr>
<td>Trial by error</td>
<td>Avoiding errors</td>
</tr>
<tr>
<td>Figure it out</td>
<td>Make it obvious</td>
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<tr>
<td>Answers open to interpretation, discussion and feedback</td>
<td>Customer is always right</td>
</tr>
<tr>
<td>End product = end of course</td>
<td>End product = launch of course</td>
</tr>
</tbody>
</table>

**Table 1. Learner versus computer user [21]**

**INTERFACE EVALUATIONS**

IMMEDIATE has progressed through a sequence of “iterate and revise” cycles [19] using different evaluation techniques to assess and improve the usability and invisibility of the system (see Table 2). The evaluations are briefly described and their main results summarized below. A proof of concept evaluation of a prototype took place in a remote area of New Zealand with the software running over the local telephone network during a two-day period [6]. In this field test, the three volunteers who were or had been distance tertiary students had to carry out several tasks specified in scenarios. Messages had to be sent in response to their queries and new learning resources made available. The actions of the participants were logged (allowing task completion times to be calculated) and they were interviewed at the end of the two sessions.

The user testing demonstrated that the learning appliance approach was feasible and offered accessibility and usability advantages. The volunteers were extremely positive about their experience with IMMEDIATE 1.0 even though the course material from a third year HCI paper was unfamiliar. The main problem reported related to the lack of an undo or go back feature. This frustrated users who felt that they were not in full control of the software.
<table>
<thead>
<tr>
<th>Iteration</th>
<th>Goal</th>
<th>Type of evaluation</th>
<th>Detail</th>
<th>Content</th>
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</thead>
<tbody>
<tr>
<td>IMMEDIATE 1.0</td>
<td>Proof of concept</td>
<td>User testing</td>
<td>Log Interview</td>
<td>Human Computer Interaction (HCI)</td>
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<tr>
<td>IMMEDIATE 1.0</td>
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<td>Heuristic Evaluation</td>
<td>Heuristics</td>
<td>Maori</td>
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<tr>
<td>IMMEDIATE 2.0</td>
<td>Usability</td>
<td>Heuristic Evaluation</td>
<td>Heuristics</td>
<td>Maori</td>
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<td>IMMEDIATE 2.1</td>
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<td>Expert evaluation</td>
<td>Demonstration Interview</td>
<td>English as a second language</td>
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<td>Heuristic evaluation</td>
<td>Scenarios of use</td>
<td>English as a second language</td>
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<td>Heuristic evaluation</td>
<td>Heuristic evaluation</td>
<td>English as a second language</td>
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<tr>
<td>IMMEDIATE 2.2</td>
<td>Usability</td>
<td>User testing</td>
<td>Observation Questionnaires</td>
<td>English as a second language</td>
</tr>
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<td>IMMEDIATE 2.2</td>
<td>Educational</td>
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<td>Focus group</td>
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Table 2. Evaluations of IMMEDIATE

After this proof of concept, the value of using IMMEDIATE 1.0 for second language teaching was recognised by educationalists who had seen a demonstration of the software. From this point on, all the evaluations involved content specifically designed by educationalists for second language teaching. IMMEDIATE was set up to deliver a course in Maori (providing the modes for reading, writing and oral practice).

A heuristic evaluation of the interface was then undertaken by an HCI expert, based on Nielsen’s [12] usability guidelines. Some of these heuristics apply to both interface and educational issues [21]. For instance, the guideline “Match between system and real world” has education and learning as its context. Similarly, “User control and freedom” is a guideline that bridges the gap between interface and student concerns. The heuristic evaluation revealed some problems with technical issues and inconsistent terminology.

After some changes to the interface, IMMEDIATE 2.0 was implemented as an application that installs and boots itself on top of the Windows operating system. This provides quick access to the required resources which are stored on the learner’s machine. The goals of the subsequent heuristic evaluation were to check whether problems previously identified had been resolved and whether the technology receded into the background [7]. In addition to Nielsen’s heuristics, some additional guidelines concerning visibility and ubiquity were developed based on Scholz and Consolvo’s [20] framework for the evaluation of ubiquitous computing applications. In total, the system was checked against 18 heuristics. The heuristic evaluation of IMMEDIATE 2.0 was carried out by an assessor with an understanding of both the interface and learning aspects. Five key usability issues were identified that needed to be addressed: “Visibility of system status”, “Consistency and standards”, “Familiarity”, “Recognition rather than recall”, and “Ease of use”. Various changes were proposed when the results of the evaluation were reviewed. For example, it was decided to change the screen layout in order to make better use of space. Consistency was also seen as important with the need to standardise terminology and the use of icons.

It was then necessary to obtain input from educationalists about the structure of a language course and the kind of content required. This would subsequently allow a more realistic evaluation of IMMEDIATE by those experienced in learning a second language. As Garrett noted [3] “It is increasingly important that on-line materials include and highlight explicit support for student use of the unfamiliar learning environments. Materials must include detailed help with learning strategies, clear learning objectives for each activity, and suggestions for self-assessment.”

Joint research was undertaken with staff of a language school who taught English as a second language (to meet university entry requirements for overseas students). They explained their key goals and the functionality they required in a teaching system.

As a result of discussions based on the expertise of the academics and the material provided to students, the following modes were proposed:

- **Learning objectives**: the higher level learning requirements should be presented
- **Reading Practice**: this study mode should provide functionality for supporting both long and short reading practice. Comprehension questions with answers can optionally be included.
- **Writing practice**: this study mode will support both short answer and long answer practice. Answers can be optionally included. It should be possible to handle exercises where students are expected to match a word with an appropriate meaning
- **Group practice**: this mode supports oral practice (speaking and listening) between pairs or group members
• Dictionary: this mode focuses on the introduction of new vocabulary, showing words, their meanings and examples of usage.

A third version of IMMEDIATE (2.1) was designed to handle the modes proposed by the teachers of English as a second language. Care was also taken that interface problems previously identified such as inconsistent menu names were corrected and a simplified layout provided. One week’s material for the English as a second language paper was entered into the updated version of IMMEDIATE 2.0 via the authoring interface by a member of the research team.

An expert evaluation of IMMEDIATE 2.1 was carried out to determine whether the proposed framework for the integration of course material (reading, writing and group practice) was appropriate and would support the academic’s pedagogical objectives. The software was demonstrated to an academic involved in teaching Maori as a second language. The lecturer subsequently had the opportunity to explore the software. A structured interview was carried out to ensure that all relevant topics were covered (Cordingley, 1989.)

In general, the system was found to provide support for the range of functionalities that would benefit and enhance second language teaching. The modular approach to language teaching was seen as appropriate but the academic himself would have broken group practice into its components (speaking and listening) and used terminology that was less formal. These changes, though, could easily be made via the authoring interface to IMMEDIATE which allows academics to tailor courses to meet their educational objectives.

The academic also suggested that more working space could be provided for students and that the course and topic information should be better integrated.

To check whether the revised layout had improved the interface, a heuristic evaluation of IMMEDIATE 2.1 (Figure 1) was carried out by 6 postgraduates, 3 with HCI expertise and 3 with experience of learning English as a foreign language. It was possible, therefore to compare the results for the two groups and determine whether the interface was seen as helping or hindering learning. After carrying out specified tasks, they rated the various aspects of the interface on a 3 point scale from strongly disagree to strongly agree. There was little difference between the results for the two groups. The mean (based on the scores of all items) was 2.25 for those with HCI experience and 2.2 for the language students. Only 5% (evenly spread between groups) expressed dissatisfaction with aspects of the interface. The most highly rated heuristic (mean of 2.66 out of a possible 3) was for “Focus” which related to invisibility – the technology blending into the background so that users can concentrate on learning. “Flexibility” and “Recognition rather than Recall” also rated well. No

heuristic had a mean below 2, the lowest score being for “Match between the system and the real world.” In the main, IMMEDIATE was seen as well presented, supporting a range of functionality appropriate for an e-learning application. Some specific problems were identified by the evaluators. Appropriate feedback was not always available to users after they had completed a set of actions. Icons were also easy to overlook. Once these issues were addressed, it was necessary to trial the software in a more realistic situation. In particular, it was necessary to see if there would be an educational culture clash [1, 2] when testing IMMEDIATE overseas with different student expectations.

An extensive evaluation of IMMEDIATE 2.2 was conducted at a large open university in Thailand by a team of Thai, Malaysian and New Zealand researchers [5]. The field test involving eleven former or current ESOL students was preceded by a pilot study involving five participants. This had the goal of identifying technical issues as well as checking out the robustness of the proposed evaluation procedures. Once problems had been resolved, the field test took place. The material used in the study had been produced collaboratively by NZ and Thai ESOL teachers.

The eleven participants who took part in a full day evaluation were required to carry out tasks specified in scenarios available in both Thai and English. The tasks involved not only self-practice (reading and writing) but also live audio and text conversations between students and with the tutor. This was the first time the multi-user functionality had been evaluated. The system was installed on each computer and was not run from USB sticks. Questions about the features of IMMEDIATE were answered in situ whilst a questionnaire about the interface (helpfulness, efficiency, learnability etc) was completed at the end of the session. Ratings for both the scenario statements and questionnaire items were on a 5 point Likert type scale where values ranged from 1 to 5 (strongly agree to strongly disagree.) Medians were calculated for the educational aspects of IMMEDIATE and means for the heuristics used in the interface evaluation. Finally, the views of the participants were ascertained in a focus group meeting at the end of the day. Views were expressed in Thai and translated into English.

All modes and features of IMMEDIATE were seen as supporting the learning process with no median greater than 2. In four cases (Listening, Assignment, Interaction and Self Assess), all of the responses (100%) were in the top part of the range. Other questions related to the stimulating and motivational aspects of IMMEDIATE. Again, there was no median lower than 2 with the exercises and assignment scoring very highly (median of 1). Unfortunately, 44% of the respondents found the Interaction (audio communication) mode frustrating to use even though the feature was seen as extremely useful.
With regard to interface issues, the responses from the questionnaire revealed that the majority of the participants were satisfied with aspects such as Efficiency, Affect, Focus and Privacy (all with means below or equal to 2.5). This indicated that the participants thought that the software helped them to perform the required tasks, enjoyed using the software and saw the technology as invisible. Eight of the eleven participants (73%) were prepared to recommend the software to colleagues. However, IMMEDIATE did not score well for Control (mean 3.2) with the evaluators finding the software did not always respond in a consistent fashion. All the respondents (100%) reported that the software, for instance, had stopped unexpectedly. This was not surprising as the audio functionality was still under development and had not been fully tested before. There were also problems with Learnability (mean 3.1) with all of the users believing that knowing how to use the software initially was problematic. Overall, only 9% of responses strongly disagreed with positive statements about the merits of the interface.

The focus group members identified various teething problems such as IMMEDIATE stopping unexpectedly and mismatches between the material in the scenarios and that shown on screen. A number of the participants suggested that Thai students would prefer a more prescriptive approach to learning rather than the more self-directed, exploratory style encouraged by IMMEDIATE. Some of them also preferred a Windows-like look for software. Overall though, IMMEDIATE was seen as, with more practice, a usable system with features such as learning support that should be included in courses for other subjects such as Maths. The Interaction (audio communication) mode, however, would need further revision and testing.

In a follow up evaluation, with the focus on the Interaction tool in a revised version of IMMEDIATE (Figure 2), all the five evaluators agreed that this would be very useful for students of a foreign language.

ISSUES
In addition to the usual problems that arise when turning a prototype into a full working system in an academic environment – building up a team of researchers, obtaining grants, and finding Masters and Honours students to carry out research, there are several more specific challenges that will be dealt with below.

Finding collaborators
The main challenge was to find collaborators to assist with the educational aspects of the research. This was crucial because in our learning appliance approach technology is adapted to the pedagogical requirements, and not vice versa. Some assistance in finding these was provided by research funders at Massey who put us into contact with staff from the English school and the College of Humanities. An overseas visitor to the College of Education with an interest in distance learning provided a link to a Thai university. It took time, though, to find people who had the required expertise and were able (in their very busy lives) to work with us. We were fortunate, ultimately, to collaborate with several members of staff (including heads of departments) from both our own and the Thai university - teachers of French, Maori, and English as a second language. They were able to assist in many areas ensuring an appropriate framework was used for teaching and that suitable course content was developed. In addition, ways were suggested of evaluating IMMEDIATE, for example proposing that questions should be answered in situ when the users tested out the software.

Usability testing
Participants had to be found for all these evaluations. Again our learning appliance concept required that as much as possible we evaluate with our target learners rather than with our own computing students. Many of our evaluators had a background as distance learners and/or experience as second language students. For the expert evaluations we drew on participants with HCI expertise. An academic who taught a second language was also involved. Data of various kinds had to be collected.

Care was taken when developing heuristics or questions to use well-recognized sources – Nielsen’s heuristics [12] together with Xerox checklist items [17], Scholz and Consolvo’s framework [20] for evaluating ubiquitous computing applications and the SUMI questionnaire which measures the Efficiency, Helpfulness, Learnability, Control and Affect [18]. Questions about the usefulness of the functionality of IMMEDIATE were suggested by a Professor of Languages with considerable expertise in delivering online courses. Two methods of collecting qualitative data were employed in Thailand: observation and focus group meetings [9]. Observation allowed us to look at the behavior of the users whilst their opinions could be captured in the focus group meetings. The focus group meetings were videoed to ensure that qualitative data was correctly recorded.

Finally, utilising quantitative and qualitative methods in Thailand allowed the use of triangulation [16] when coming to conclusions. Different aspects of the situation can be considered [10]. Cultural concerns only emerged in the data collected from the focus group meetings. Triangulation also allows for results to be cross-checked and interpreted in context. For example, whilst the mean for learnability was quite low, the authors of the SUMI handbook [20] recognize that this can be a temporary effect where participants have not had enough practice with software.
Clearly, this was the case in Thailand where the participants reported in the focus group meeting that they would quickly become accustomed to working with IMMEDIATE. Throughout the whole evaluation process, pilot studies were carried out as necessary to ensure that the instructions, questionnaire items etc. were comprehensible.

Going offshore
The major challenges occurred when going offshore to evaluate the software in a realistic situation.

Obtaining permission
While some links between the New Zealand and Thai universities were already in place it was not possible to run this evaluation overseas until a memorandum of understanding had been signed. Neither funding nor approval could be obtained until this point. Permission to proceed with the evaluation was then given by a high ranking member of the administration at Sukhothai Thammathirat Open University. Three of our collaborators (in senior positions) supported this project and were instrumental in helping the evaluation to take place.

Software conflicts
The learning appliance is complex software. Its close integration with the underlying operating system, which is key to its low visibility, also makes it vulnerable to shifts in that platform. Commercial applications like web browsers are constantly upgrading to meet these shifts. This is much more difficult for a small research team with limited resources.

On arrival at the Thai university for the pilot study, it was discovered by the team of two that the university had upgraded its computing laboratories from Windows XP to Vista since a previous visit to finalise the evaluation details. The additional security measures introduced into Vista by Microsoft interfered with IMMEDIATE’s network activity. Whilst it was possible to get IMMEDIATE up and running on Vista in time for the evaluation, the communication functionality did not work consistently throughout the pilot study. (By the time of a short follow-up evaluation a year later using a memory-stick version of IMMEDIATE, the laboratories had upgraded again to Windows 7!) Furthermore, there were errors in the Thai versions of the scenarios and questionnaires. Modifications to IMMEDIATE also meant that there was a mismatch between the software and the Thai scenarios. Whilst the translations were corrected, they could not all be checked against the software whilst it was being modified.

Nonetheless, the pilot study provided the opportunity for testing IMMEDIATE with five participants using high performance computers. The focus group identified various issues that needed to be addressed before the field test. It was clear that significant changes needed to be made to the software and scenarios. A more thorough introduction to the evaluation and the software was also required. Fortunately, staff at the Thai university plus an additional two members on the evaluation team, were able to assist with these issues. Several days were dedicated to testing out the changes to the software and translating the required material. Whilst there were still some glitches in the subsequent user testing, it proved possible to
successfully evaluate a multi-user version of IMMEDIATE despite the pilot study from hell.

Translation
It proved vital to have a Thai speaking member on the research team even though many staff of the overseas university were competent English speakers. This was useful at meetings prior to the evaluation where it was sometimes necessary to translate information about IMMEDIATE. This expertise was also needed to translate some of the scenarios and questionnaires for the evaluation into Thai. Finally, the focus group was run by this researcher who led the discussion in Thai and translated the responses of the participants into English.

The authoring interface
The authoring interface provided a mechanism for entering the content including the learning support. This module, though, did not provide a very usable interface given that the focus had been on developing the student end of IMMEDIATE. Content had to be input by members of the research team and changes could not easily be made by academic staff. The process of data entry was time-consuming. It did not prove possible in the Thai field study to include as much material as was required to provide a rich environment for students to explore. Without this there was not enough flexibility for the self-directed user.

Cultural issues
One’s culture can be revealed through patterns of thinking and behaviour [4]. Olaniyan [14] observed that distance students would not necessarily welcome a learning innovation that conflicted with their culture. This risk was managed in various ways when evaluating IMMEDIATE in Thailand. One member of the evaluation team was Thai, the content was based on material developed in Thailand, and several of our NZ collaborators had considerable knowledge of the Thai culture. As a result of the focus group meeting, it became clear, though, that there were still some cultural challenges. Three issues were seen as important:

Firstly, with regard to the evaluation process itself, some participants complained that the user manual and scenarios contained too much text. Compared with people of neighbouring countries such as Vietnam and Singapore, Thai people read very few books [22]. This can be explained by a history in which reading was confined traditionally to the upper classes. In subsequent evaluations, more illustrations could be provided to help people understand exactly what they were being asked to do.

Secondly, despite the introduction of second language teaching at an early age, the level of English proficiency of Thais rated poorly when compared with other nationalities of Southeast Asia, e.g. Malaysia, Singapore, and the Philippines [24]. The Thais have few opportunities to communicate in English with others. As a result, the evaluators did not all have the assumed level of competence needed to work on the second language course using IMMEDIATE where the content and interface is presented in English. The participants agreed that in these circumstances it would be helpful to have some of the contents such as the study guide and learning support available in Thai.

Finally, IMMEDIATE ESOL contains a reflection mode in which the user can keep a learner diary. The participants on the whole, did not see the need for such a feature. This result is attributed to that aspect of Thai learning culture which focuses more on top-down, rote learning rather than critical thinking [11]. Nonetheless, the participants were able to use the reflection mode without any difficulty. It would be up to the lecturer on a course, in practice, to decide whether or not to select this mode. If it is deemed culturally inappropriate it can be omitted or introduced on more advanced courses.

Despite these cultural challenges, the Thai participants still saw IMMEDIATE as a valuable tool for distance learning. None of the problems raised above was insuperable as IMMEDIATE can be tailored to meet particular requirements. This study, though, shows the importance of customising IMMEDIATE to meet the needs of teachers and students from another society.

CONCLUSION
When used for teaching foreign languages in distance mode, IMMEDIATE has to support interactivity and communication along multiple dimensions such as speaking, listening, reading and writing. The series of evaluations involving realistic tasks and content indicated that IMMEDIATE is capable of providing appropriate functionality in an accessible way.

These evaluations have led to IMMEDIATE 3.0, which is fully functional from a USB memory stick, and which integrates audio and text communication into every study mode. To reach this point required a great deal of time and commitment particularly in an academic environment. The sheer scale of the enterprise was occasionally overwhelming with a large team of people having to be involved. The software had to move from being a prototype to a full working system with a usable interface. Once this goal had been achieved, it was seen as essential to trial the learning appliance in an international context. The lack of autonomy when carrying out research overseas: relying on others for the provision of facilities, selection of evaluators and timetabling of activities was at times frustrating. Nonetheless, the technical, practical and cultural obstacles have all been largely overcome and the stage has now been reached where the focus can move to testing the learning objectives of educators.

The Thai evaluations have also led us to begin exploring software engineering techniques for the automatic
configuration of the interface in the user’s language, in a culturally appropriate manner, to enhancing the usability of the learning appliance and reducing its visibility.

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