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DISSEMINATE, an initial implementation proposal: a new point of departure in CALL for the 'year 01'?

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Abstract

This paper presents a proposed initial implementation for the DISSEMINATE concept and architecture first presented in 1998 at WorldCALL. Via an explanation of the explosion of the acronym, the article summarises the key points made in the initial article published by Swets and Zeitlinger in a volume edited by Chambers and Davies (Delcloque, 2001) where the project was described as the "implementation in the digital domain of the ring-binder philosophy". It explains the slight changes and refinements brought to the general approach since its inception, presents briefly the results of a survey designed to examine authoring requirements and authors' attitudes to authoring tools, summarises evidence of partially similar approaches taken by other developments and outlines the possible paths to the implementation of the project. It discusses some early proposals relating to the Macro Infrastructure and presents a Micro Module example. The article concludes with an explanation of the proposed provisional distribution structure, including commercial considerations, which, in the authors' view, cannot be separated from the theoretical and practical questions which the concept poses. The conclusion also suggests that the principles of DISSEMINATE, whether or not resulting in a product, could nevertheless influence present and future digital learning authors.

1 Introduction

DISSEMINATE is a mnemonic *notional acronym* capable of brand recognition. By notional acronym, we mean an entity which embraces as a word the totality of a concept while retaining intellectual coherence in its exploded parts. The key features of the concept are summarised in section 2. Such acronyms are not uncommon, witness the coining of GUIDE (Guided User Interface for Didactic Environments) introduced by a

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Didascalia authoring team (Decoo and Colpaert, 1999). The reason for using such an acronym is simply that the concept itself cannot be adequately summarised by a single word or expression and, indeed, because of its international ambitions, we have carefully selected a word cognate to many Latin-based languages. The DISSEMINATE principles of authoring of digital materials may be considered to represent a departure from systems currently in place; recently the project has decided to focus its attention on Web-based learning delivery and authoring which pose particularly challenging questions with respect notably to the promotion of speech-enabled interactive language learning (both seen from the point of view of authentic spoken comprehension /perception and from the point of view of active speech production). The project, therefore, attempts to create a structure which might enable more rapidly the production of e-language-learning more compatible with the predominant communicative approach, and in turn merit the description of Web-Enhanced Language Learning (WELL) having progressed away from a more silent medium of presentation and delivery.

2 Summarising DISSEMINATE

The key features of the proposed development model are found in the explosion of the acronym. We remind the reader (following the first article [Delcloque, 2001]) that DISSEMINATE is an 'authorable' acronym, meaning both that one of its component letters may mean more than one notion or feature (as will be shown below) and that readers could themselves make alternative proposals, stimulate discussion and customise the system by suggesting that one of the letters should stand for a different adjective. Indeed, it is important to note that the proposed adjectives within the acronym have changed in this second formulation compared to the Web site at `http://www.disseminate.org.uk/` which duplicates the first article.

D stands for **Distributed** and by this we mean that the system will attempt to reach critical mass across platforms, across browsers and, where applicable, server solutions, without falling into what we might call the 'lowest common denominator trap'; the advantage of the hyper-collaborative development model suggested is that support for a particular platform/server solution may be distributed among the consortium to partners best equipped to support the said platform and/or server solution. Modules would be described as compatible with a particular operating system (OS), server solution and browser. It is, however, highly desirable to achieve what could be labelled 'core compliance' so that, not just authoring modules but more crucially courseware end-products operate on stated supported operating systems and browsers. For this reason, the development will be framed within the more general IMS standards (see `http://www.imsproject.org/`).

I stands for **Integrated**. Integration means several things, the tools will integrate with real world solutions (that is tools used in the real world of business and education such as Microsoft Office, Macromedia multimedia products, databases and communication systems such as e-mail, speech technology solutions, etc.). This is clearly no mean task and initial development on DISSEMINATE will only address these issues at the level of conceptual design of the Macrostructure (Infrastructure of the whole system). E-learning systems which integrate well with real life applications include the rather expensive TopClass from WBT Systems `http://www.wbtsystems.com/` which relies on an

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Oracle database. Integrated also implies a system designed and driven by the needs of learners and their pedagogues with a structure which allows for both instructivist and constructivist approaches and which leaves as little imprint on end-products as is possible within the multi-level mediated domain which results in the creation of 'digital signatures' (see Delcloque, 2001). For Ron Cole, one of the critical readers of this article prior to publication "from a software engineering point of view, integrated goes along with modular and scalable, it relates directly to the architecture that underlies the system, and the way that modules talk to each other. For example, the CSLU toolkit `http://www.cslu.org/` uses an event driven architecture, the DARPA communicator system uses a hub architecture...Integrated refers to the graceful interaction of modules within an architecture incorporating well motivated Application Programming Interfaces (APIs) enabling graceful interaction of a wide variety of speech and language technologies (e.g., recognition, Text to Speech, Natural Language Processing, Dialogue Control) and multimedia objects". (Cole, 2000, personal communication)

S stands for **Stable**, the first truism, no system can either be accepted or retained without robustness; stable also means durable and indeed many authoring systems hardly fall into this category. Stability will come from reliance on industry standard tools and protocols and a constant awareness of authors' and learners' needs.

S stands for **Scalable**. This is a crucial departure from our original definition of the elements of the acronym (the first proposal was 'superimposed'). Although the idea of scalability had always been implicit, it needs to be considered now as one of the most important overtly stated features of the grand plan as well as one of its most attractive assets. Scalability implies that the system would be easy to update, add on to as well as withdraw from, and the notion is crucially linked with the evolutionary nature of the construction. To use an architectural metaphor, what we propose is a building made of individual 'bricks', all small in size, fitting together properly with good mortar and no leaks. Critics may feel that such a building lacks the robustness or water-proof quality of a modern concrete edifice, but authors as well as users may appreciate the ease of use and low learning curve of such a lego or meccano set compared to the monolithic structure of both sophisticated conventional authoring tools and Web courseware delivery systems. Why have a feature if you don't need it or use it? This orientation also corresponds to modern computing trends which started in the 90s with Apple Opendoc and Microsoft OLE.

E stands for **Evolutionary**, this is a major feature of the design and tools. The modular development proposed which draws much on the 'small is beautiful' principle will be engineered so that it can be modified easily as a function of developments and trends in courseware developments, thus protecting it from 'built-in obsolescence'. We argue that not enough authoring tools are built 'to last', they lack the 'built-in ability to evolve' while providing a reasonable degree of robustness in legacy support.

M stands for **Modular**, another key feature. The initial small consortium of partners will seek to design the authoring suite in such a way that all components are stand-alone modules which interact reliably together. It will be possible for authors to make use of these modules independently of the suite; so to fit the DISSEMINATE principles, an authoring suite must have modules capable of independent functioning, similar to the WIDA suite `http://www.wida.co.uk/or` Hot Potatoes products `http://web.uvic.ca/hrd/halfbaked`.

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I stands for **Interactive**, the second truism, and one which also needs to be stated in the context of Internet delivery. The well-known Hypertext Mark-up Language (HTML) is a hypertextual presentation medium, it is not one which encourages serious interactivity, having being designed largely to communicate large bodies of information within a particular scientific community. The success of the Web means that better mechanisms are being invented daily to make the Web more interactive (in real time), but one must be prepared to admit that so far Internet-based delivery cannot rival the level of interactivity found in conventional language courseware.

An equally strong candidate for *I* might have been *Intelligent*, an absolute must to produce useable interactivity. DISSEMINATE partners and authors will seek to put real meaning behind the notion of Web-based intelligent courseware and software. In Phase 3 of the project which follows on from the current initial implementation proposals, we will seek the views of the CAL(L) authoring community on what they consider appropriate definitions of the terms 'interactive' and 'intelligent' courseware. This may in turn guide our design considerations. In general, we hope that DISSEMINATE development will be largely author and user driven.

N stands for **Networked**, simply to emphasize the fact that the design will use standard communication and supervision protocols, with a Client-Server Implementation for the full suite including the different types of mail connectivity (e-mail, bulletin and chat).

A stands for **Authorable**, the key concept and feature which started the whole process in the mind of the first author in 1994. This is discussed in much more depth in the first article describing the background and the theoretical foundations to the vision (Delcloque, 2001). Authorability applies here at the level of courseware production and indeed authoring tool production and use; the idea is simply that none of the modules of the suite are protected from modifications. This allows authors to combine a template or *paradigmatic approach* (found to be very popular) with a freer method of creation, the *toolbox approach* which allows an author to create his/her own screen, functions, exercise types, etc... Being able to modify a third party template saves a significant amount of time compared to starting from scratch. It is hoped also that authorability in a critical mass authoring suite will reduce the inevitability of the 'reinvention of the wheel' which has plagued so many courseware/software developments in language learning as well as other disciplines. Authorability is considerably easier in the early 21st century because of the rapidly advancing open standards, demonstrated for instance by the success of Linux, now used by tens of millions of people world-wide and adopted by major industry players such as Corel, IBM, etc... `http://www.linux.com/`. *A* also stands for *Accessible*, both in the financial sense and with respect to the quick learning curve.

T stands for **Tracking**. Once again, this is a standard in delivery systems, particularly for learning on the Web (see Blackboard, eCollege, TopClass, Web-CT, etc.). Institutions demand that teachers should be able to closely monitor the work of learners and communicate with them efficiently. Tracking is an optional element and facility within the DISSEMINATE design, the reason being that many authors do not require, wish or have time to track their learners and, given that any particular authoring module could be used on its own, DISSEMINATE authors will be able to design exercises to accompany their classes, and these might consist of a simple protocol such as a Multiple Choice Question format (MCQ) without the need to learn the functionalities of an entire

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authoring tool or suite. The models here again are systems like the initial WIDA tools (ChoiceMaster) or Hot Potatoes Modules. Tracking is reserved here to monitoring and saving of interactions. There will naturally be a Results module which will keep all learners' scores, text input, etc., anything designed to test performance and learning. The Tracking and Results modules may use the same database or two separate ones.

E stands for **e-learning**, marking the emphasis recently chosen by the project for specialising on Internet delivery. This choice is motivated by two complementary factors: the first is the sheer glut of authoring systems already available for conventional computing environments including some dedicated to the production of language learning materials such as the CSLU Toolkit or GLAS `http://www.cslu.org/`, `http://www.blueglas.com/`, both of which are very high performance tools, one of which is free. Although no system to our knowledge yet completely espouses the DISSEMINATE philosophy in standard computing environments, it is felt that authors have enough good products at their disposal for producing sound quality interactive materials to deliver on CD-ROMs, etc. By contrast, delivery on the Web presents a much greater challenge. There are few systems dedicated to language learning. Our survey confirms that Hot Potatoes is the best known. The majority of linguists authoring materials for delivery on the Web use one of three possible strategies:

1. They produce their own exercises from scratch or by drawing on existing templates designed for other purposes and standard Web authoring tools (Dreamweaver, Frontpage, Pagemill, etc.). This may involve some HTML programming or tweaking.
2. They use free products such as Hot Potatoes or similar free or fee paying developments (see the Java-based Xercise Engine `http://www.ruthvilmi.net/hut/XE/Demo`) or the London Guildhall University Authoring Suite at `http://www.lgu.ac.uk/langstud`, the Cold Fusion based Rice University development at `http://babel.rice.edu/extemplate/` or the Canadian TLC tools at `http://pages.infinit.net/tlcserv/products.htm`.
3. They use much larger products such as Blackboard, Web-CT, etc. This might be dictated not by their wishes but by the choice made by their institution; in other words, if you want to or have to track your learners, and/or have to deliver a course at a distance, then you must usually adopt the system which your institution has a licence for, adopt being the operative word rather than adapt, which might be much more useful. DISSEMINATE obviously will allow authors to adapt much more easily.

The absence of a flexible, modular suite of tools, *built from the ground up*, makes it difficult for the author with little time for learning to use a large system to get involved in the production or modification of learning materials for delivery on the Web. Equally, authors in primary and secondary education who may not have at their disposal such tools as Web-CT, or even server-based solutions, may only use tools of the first two types (1 and 2) For the combination of these reasons, DISSEMINATE would offer a much more readily useable solution which could penetrate all sectors of education and indeed the business community in need of training. The critical mass effect of a large community of authors worldwide working on different platforms in different environ-

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ments could produce a large-scale sharing infrastructure which could only stimulate the growth of pedagogically sound language courseware and, given that DISSEMINATE is proposed to be, in time, a generic development, not a discipline-specific one, a feature which it shares with all the large on-line learning systems such as Blackboard and WebCT, the project could soon expand into non-language disciplines.

For a fuller explanation of the DISSEMINATE principles, advocacy of its virtues and uniqueness and for a statement of its foundations on the notion of the *mediation of learning*, the reader is advised to view the previous arguments outlined in the initial article by the first author (Delcloque, 2001), also reproduced on the project Web site: `http://www.disseminate.org.uk/`.

3 Reactions, survey and evidence of potential take-up

Stating a vision to stimulate discussion is one thing, testing reactions and providing objective evidence of both the needs and opinions of actual and potential authors is much more important to underpin the validity and realism of this development. This is what we undertook to do in the first half of the year 2000. A study was undertaken on 201 subjects to examine authoring requirements and establish authors' general attitudes and reactions to existing authoring tools and potential ones such as DISSEMINATE. The survey was initially tested on 26 subjects in Scotland to ascertain in particular whether questions could be considered 'loaded' (containing the answer in the question) or contradictory. The survey in fact remained identical after it was established to be a sound instrument to answer the particular research question(s) under study. Essentially, the purpose of the survey was to examine whether the various features of DISSEMINATE contained in each adjective of the acronym would receive favour with established authors.

The analysis of 201 results is reported briefly here. An update on results at the time of publication of this article (late 2001) can be obtained from the project Web site where respondents have now reached 252. Updated results, however, can only be provided to enquirers who participate in the survey. The survey itself can be found on the DISSEMINATE Web site as an on-line questionnaire which automatically feeds the results into a database and links up to 'live updated' results (252 + n); all replies were collected anonymously unless a particular respondent was happy to reveal his/her identity for future communication purposes.

Of respondents, 61% were linguists and the majority had at least some authoring experience. The initial questions in the survey are designed to build a respondent profile which leads to sub-categorisation. There was a very good geographical and sector distribution among the respondents with approximately 40% from the US and 60% from Europe representing different educational sectors ranging from primary school to universities (more than two thirds came from Higher Education backgrounds, as could be expected). It is therefore reasonable to assume that the views expressed in the survey represent an accurate sample and cross-section of the authoring community (at least in CALL). It was interesting to note too that the responses of non-linguists were very similar to those of linguists. The other striking feature was the degree of agreement between respondents with most questions showing very low standard deviations. Authors were reasonably satisfied with the authoring tools which they had used which represented more than 20 different ones on Macs and PCs.

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The clear majority indicated a desire to see customisable authoring tools; they were in favour of using templates but felt frustrated about not being able to modify those. To questions which may, at first glance, appear contradictory, authors confirmed that they liked to use templates to save time but still wanted to design their own screen, and it is remarkable that practically no authoring system dedicated to language learning allows one to combine the two approaches.

Of respondents, 92% favoured authorable software and courseware and, within that figure, most were in favour of exchanging their products (and this is without even being told that they would gain substantially in the exchange, in other words, that they would receive ten modules for giving away one). Comments confirmed that authors felt that existing tools were too inflexible. As regards specific features of authoring tools, most respondents felt that the ability to check learners' progress and the ability to communicate with the learner, at least in differed time, were important (this is probably due to the predominance of respondents from Higher Education [HE]). The majority of linguists considered that CALL courseware cannot replace live teachers, can merely supplement class teaching and recognised that courseware was still not intelligent enough, and that the ability to program progressive useful feedback was still largely absent from authoring tool standard design, all rather unsurprising results.

One surprising finding of the survey was that DISSEMINATE, despite not having a product yet, was relatively well-known, in particular, it was more widely known than an EC funded project (MALTED) or a product which had benefited from substantial cash and time investment (SCET Pioneer).

The general conclusions from this survey suggest that most of the ambitions of the project and development as well as its general philosophy would find favour with existing authors including those in the non language community. The precise results appear in the appendix with colour graphic representation on the project Web site. It would have been useful to compare the results of this survey to any similar research undertaken previously but, as far as we are aware, this is the first survey to assess directly and in any depth the attitudes of language authors to the tools which they use or could use. The only other project we could direct the reader to at this stage is the MALTED development which is extensively mentioned in ICT4LT Module 2.5 on Authoring Programs (Bangs, 2000). More details of MALTED can be found on the project's Web site `http://www.malted.com`. We were not able, however, to obtain the results or the analysis of the more general survey carried out by MALTED at the inception of their own development in 1998. The reason why this project is worthy of a mention is because it appears to have some significant similarities in philosophy and approach with DISSEMINATE, which, in our view, reinforces the strength of our argumentation in favour of the adoption of more flexibility in authoring tool design.

In addition to the evidence provided by our survey, more informal evidence of the potential take up of a system like DISSEMINATE has come from reactions to papers at conferences, messages sent to the Web site including the participation of future authors and, more generally, the fact that other developments appear to share similar objectives or use similar procedures or contain features suggested by the elements of the acronym. The best known of these parallel endeavours is undoubtedly the Hot Potatoes development by Half-Baked Software. There is little doubt that we are witnessing the same enthusiasm for the production of authoring systems for delivery of materials using

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the Internet as we have seen in the area of authoring tools for use in off-line computing environments.

4 DISSEMINATE: The Macro Infrastructure

The fundamental difference between DISSEMINATE and existing tools is that its elements will all function independently and are optional. The suite of tools will simply be a menu of modules linked together and to database and communication structures. The suite will be built 'from the ground up', forming a collaborative framework which other tutor-authors could expand upon in a development parallelling Linux.

DISSEMINATE elements will include the following: from this point on, we shall use abbreviations to describe them and a capital D for DISSEMINATE.

1. At the bottom of the 'pile' will be the most basic **Authoring element** or **A element**, which in effect deals with a single exercise type. What is meant by this is that authoring modules either with an .htm suffix or capable of generating .html output will have a dedicated and specific exercise function. We are very familiar with such structures, they have been produced and delivered in CALL and other fields. These 'web screens' will in effect share some similarities with the early and recent WIDA programs or Hot Potatoes modules. They are important for another reason: the minimum unit of production and learning in D (from an output point of view at least) is anticipated to be the *Web Screen*, although modules such as Hot Potatoes which involve a process of transformation would still qualify as resulting in one or more Web screens in terms of end delivery. Exercises would be made of Web screens with or without interactions, lessons made of exercises and courses made of lessons, etc. using the standard didactic hierarchy. It is sensible for a single activity or interaction to situate itself within a single screen, just as it is sensible for a 'live teacher' to be teaching a single notion at any one time to his/her learners.
2. The second layer of development is what we would call the **Complex element** or **C element** (where C stands for Complex or possibly Combined); these C elements may be autonomous designs or result from the combination of basic embedded A elements. An example of this is given at the end of this article which describes an experiment using core Web technology such as Javascript to build such a module. Second author Bramoullé, as will be seen, undertook to construct a Comprehension and Dialogue Module which might rival standard templates found in well-known learning programmes such as Hyperglot/The Learning Company Learn to Speak `http://www.thelearningcompany.com/SubCategory.asp?CID=152`,Vektor Connections `http://www.vektor.com/` or Mast Learning Systems Hotel Europa and Up to Standard, etc. `http://education.cd-rom-directory/cdrom-2.cdprod1/004/235.Hotel.Europa`. These C(omplex) Elements could constitute the backbone or entry to a listening and/or speaking lesson with its different *embedded basic A elements*. Such complex modules are useful because they save the (potential) third party author time in deciding his/her pedagogic strategy and speed up the development process. The drawback is that they naturally impose a particular didactic approach (that of the

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complex element creator) made of the sequence and/or combination of the A elements or exercises. Terminologically, we would suggest that it may be useful to refer to *paradigmatic authoring strategies* (in choosing the various modular sub elements) and *syntagmatic authoring strategies* in deciding the sequence or order in which they are used. This is helpful to describe authoring procedures and differs conceptually from the traditional use of the term 'paradigm' and 'toolbox' in the description of authoring tools (template against free) mentioned earlier. The use of paradigmatic and syntagmatic is borrowed here from linguistics to describe the methods by which a particular authoring strategy is developed, a process which is bound to have an effect on learning procedures.

3. Tracking and Communication Modules and Elements: the third category of elements within the DISSEMINATE infrastructure is optional elements designed to supervise the work of the learner and/or communicate with him/her.

Firstly, let us examine why such elements should be optional. Although, when asked the question whether teachers/authors wanted to monitor closely the work of their learners, 81% of our respondents responded in the affirmative, the situation in the real world, especially outside HE, is very different for a whole variety of reasons. Many learners do use courseware in self study mode without supervision, this is clearly the case with many stand-alone CD-ROM products. Teachers do not always have the time or wish to monitor progress or grade work done. Learners may also be put off by being supervised or monitored.

Why make a facility an integral part of an authoring system if this facility might only be used by a relatively limited number of authors and deliverers? The reason why it may be unwise to make such elements compulsory is simply that the potential author, faced with a large multi-featured system, may be deterred from getting involved at all because of the steep learning curve implied. We see this happening again and again with on-line learning environments. Faced with all that needs to be learnt, the teacher just gives up and never develops an interest in authoring. By contrast, getting potential authors involved by taking a small step at a time ('brick by brick'), for instance authoring one exercise for one class one day and building on this gradually, is often a much more successful strategy to promote critical mass involvement. Once again, the 'small is beautiful' philosophy applies here.

These communication and tracking elements may be labelled **External elements** or **E elements**. Real world tools will be used, rather than re-inventing the wheel; for instance, a well-known database (Access or FilemakerPro) may be used to construct both the *Results Module* (which would combine results retention with analysis and reporting) and *Interaction Tracking* (which would record learner performance within the system). It may also be possible to turn either or both facilities on and off (which also resolves problems in countries where the legal system makes tracking difficult). We are not suggesting, however, that this on and off switch be made available to the learner (except where, legally or practically, this may be required or desirable). Communication elements might be based on standard linking to an e-mail client (after all this is easily done from within standard browsers). Two examples of basic communication can be given within DISSEMINATE. A learner would e-mail his/her teacher by clicking a button linked to that person e-mail address, from within the browser, the linked e-mail client,

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for instance Outlook or Outlook Express within Internet Explorer, would send the message to the relevant class or group teacher. Class level communication could be performed in the same way with a button called Class or Bulletin or Forum which would be a Chat room within the communication section of the particular screen. The Chat and Forum modules have now been created.

External modules/elements may also include the use of voice input which is likely to penetrate Web-based learning environments. The Project Macro Structure is represented in Figure 1.

5 Building the first module: an experiment in the Micro Modular Structure

Our original intention was to situate DISSEMINATE within Java or at least within Javascript. If built using Java, the project was going to share features with Blackboard more than with Web-CT. If Perl was to be used, then it would be more compatible with Web-CT. These were the first avenues of broad investigation. Perl is a language principally devoted to manipulating text. It integrates well with Common Gateway Interface (CGI) scripting since Perl can be used to write such server scripting. Java could be embedded in an html page as an applet or be used as a stand-alone application. Java servlets would perform similar functions to CGIs. In reality, after weighing the pros and cons of these various solutions, we elected to use Active Server Pages (ASP) instead of CGIs on a temporary basis (this suited our local development situation which is heavily Microsoft orientated). We will, in time, look at Java Server Pages too (JSP), Perl based solutions or PHP (Hypertext Preprocessor).

The C element named *Dialogue* whose structure is described below uses html and Javascript. A sub part of it is the dictation screen which uses a Java applet; for the tracking function, Dynamic html (DHTML) is used. The initial 'leaning' towards full Java was simply that, in theory, with such a powerful language, there is no limitation to the type of interactivity which could be engineered but the 'real world of the Internet and

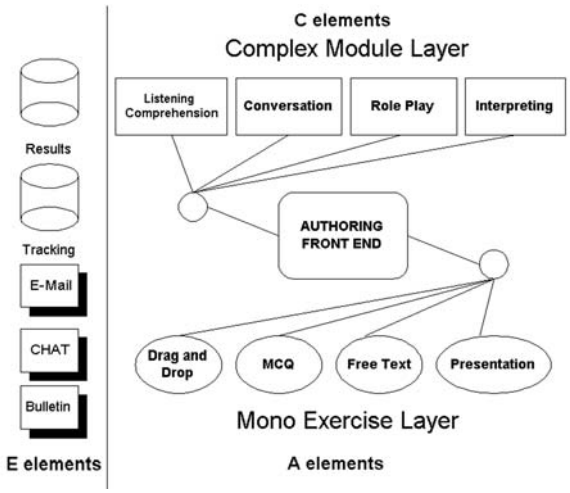


Fig. 1 The Macro Structure

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Learning' forced us to reconsider this solution (see section 6 which explains the proposed future development plans). Java is also popular because one can hide the code. Serious Java expertise is expensive, the Java learning curve is long, adopting Java would have made DISSEMINATE too programmer dependent which goes against the very philosophy of the project.. This early phase was nevertheless very useful in establishing how the traditional combination of a programmer (second author) and a linguist and pedagogue (first author) could work to produce an effective and quite sophisticated pedagogical module for delivery on the Web.

The brief was simple enough: to duplicate in a Web-based environment the quality of interactivity found in a conventional computing environment and to ascertain what was required to achieve this ambition. We were particularly interested to find out:

1. whether we could rely on freely available (perhaps proprietary) plug-ins.
2. whether we could produce modules compatible with Web-CT which enhanced linguistic interaction (compared to Web-CT standard authoring protocols).
3. whether standard spoken interactivity expected in a conventional environment (ability to play back and record speech, including the learner's), speech recognition and synthesis integration, etc was achievable at all, and especially within a small budget and with a team of only two.

The experiment did answer all these questions and met the basic design criteria formulated by the first author. The Complex Element Screen is shown as Figure 2.

Facilities sought included the ability to show or remove Source Language and Target Language subtitles in any combination; for the display of text and pictures to accompany the spoken dialogue (sub-titles); to interrupt/pause the flow; and of course to interact via exercises and to access these exercise types in an ergonomic fashion without leaving the screen.

The fact that all these ambitions (considered quite sophisticated within a Web-based environment) were met with standard Web technology was reassuring. In addition, the second element of the brief was to create a Client-Server communication and tracking structure. This was achieved via the use of standard ASP programming, used extensively for communication with databases.

This successful experiment proves in our view that the construction of an authoring system with the characteristics of DISSEMINATE is feasible. It will, however, require significant dedication in time, serious computational expertise and therefore ultimately will need to be financed. Section 6 outlines the initial proposed construction of DISSEMINATE.

6 Building the full edifice

Our first task will be to define clearly all the elements of the Macro Structure and to leave open the possibility of using existing external tools (database and communication) or create bespoke ones (either reliably across platforms or for individual platforms [just Macs and PCs]). At the bottom of this construction will be the Single Exercise Modules (A elements), combinable into Complex Exercise Modules (C elements) all reliably interacting among themselves, with the front end(s) (authoring entry module[s]) and

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Fig. 2. The first Module, a C(omplex) element

with the E elements (Database and Communication).

Phase two will be the incorporation of an existing suite of tools considered to perform written tasks extremely well and framed within XML. This, if successful, would create the initial distributable authoring framework of some ten to twelve modules. Several of the most useful activity or exercise types created for language learners and their teacher-authors would be included. The modules would cover most of the 'typical' requirements of the study of language in its written form with some innovative modules covering at least listening comprehension.

Phase three would consist in building modules which deal with better spoken interactivity and the spoken language in general. Initially, a small number of 'typical' exercise types would be created to cover listening comprehension, dictation, role playing, conversation simulation (*à la* Auralang early templates), vocabulary memorisation, pronunciation practice and perhaps liaison (consecutive) interpreting, to name just a few examples.

At that point, the system would be released in its final 'core' version (that is the initial suite of modules, a minimum of fifteen). The plan then would be to encourage other authors to create and distribute more specialised authoring modules of types A or C and programmers to work on E elements to integrate within an organisational framework outside the initial server (communication and tracking) solution chosen. That has to be the advantage of open source distribution. If all this worked, we could then expect a large body of useful (language learning and authoring) templates/Web screens to be created which could be shared and marketed within the potentially large DISSEMINATE 'community'.

6.1 The core tools used in the construction

We have already explained some of the core Web technologies which we intend to use. We will summarise here the reasons why we have chosen them:

1. Dreamweaver Ultradev will be used because it is a high performance, easily

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available Web construction tool, with an inexpensive educational licence. One of the most important technical advantages of Dreamweaver is that it allows the production of useful 'Editable Regions'. DISSEMINATE authors would, however, not need to purchase Dreamweaver, unless they wanted to create different authoring modules and wanted, like us, to save time writing the html code. They may not even need it to modify existing modules. Tools such as BBEdit could also be used.

2. Extensive use of Javascripting will be made.
3. Equally extensive use of XML will be made. The advantages of XML are numerous and well covered; for readers not familiar with XML, the structures allow the easy separation of content/data and display, and they allow the custom definition of tags. XML promotes a hierarchical structure which mirrors conceptual organisation and logic.

For informative summaries of the use of XML in language learning see Mills (1999). The article also demonstrates the easy integration of XML with Javascript.

Another obvious advantage of the adoption of the XML standard is the current development of the VoiceXML standard, which will handle voice interaction on the Web at least via telephone lines, see `http://www.voiceXML.org/`.

6.2 The DISSEMINATE commercial or 'Business Plan'

Serious questions might be asked as to how such a system, available inexpensively, could ever be financially (and therefore technically) viable and sustainable. The very same questions will have been asked concerning the development of the Linux Operating System. The answers are quite simple and indeed will resemble some of the financial and commercial rationale which led to the success of Linux.

Firstly, although DISSEMINATE might, arguably, never produce profits from selling authoring tools, it could derive its profitability from:

1. Licensing royalties related to end-user (learners) base size or straight sale of the suite in two formats (basic authoring or full including server solution).
2. Training of Teacher-Authors and Teacher-Supervisors.
3. Distribution of Content (Existing Lessons and Courses written by authors using the tools). This is probably its biggest potential source of income.

For these reasons, it is conceivable that the development could attract venture capital funding. The distribution structure might involve a World Site (located currently on world domain .NET) dealing with all national distributors and generic product enquiries, National Sites (one for small countries) and Regional Sites (for larger countries such as the USA, etc.), Sector Sites (for developments in disciplines other than Languages).

Quality control and assurance might be carried out by the world site and national sites to ensure that newly produced modules conformed to specifications and were reliably compatible with the DISSEMINATE 'core suite'. This quality control would be no different from the Quality Assurance exercised by Macromedia with respect to officially recognised and stamped Dreamweaver extensions. Only modules properly tested by the

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DISSEMINATE world site would be DISSEMINATE certified and a fee would need to be paid for such testing to deter non serious parties. The said modules would then be made available on the world and national sites (once localised). One of the functions of national sites would be to either check the translation of localised modules (for which a fee would be paid) or localise the modules themselves. We would anticipate most additional modules to be available free or as swaps, although, as in the case of Macromedia products, individuals or companies could sell new modules from their own Web sites if they so wished without paying any fee to the DISSEMINATE project other than the initial Certification or Localisation fee. Any fee-paying module (not part of the core suite) would need to be supported by its originator(s). The world and national sites might carry a type and subject catalogue of these modules with Web links.

We believe the structure described here is both achievable and more importantly sustainable. The DISSEMINATE official core suite would be available inexpensively on installation CD-ROMs much as versions of Linux are. We do NOT anticipate that it could be made downloadable as it would require to be installable on a local end-user server (for the full Communication and Tracking or C&T version) and would be rather large (at least one full CD-ROM). Add-on modules, however, could be downloadable.

We are commissioning a marketing and management report to determine the proposed commercial distribution structure for DISSEMINATE products. This will be framed within a fast developing multi-level marketing structure typical of e-commerce trends.

In reference to the Napster music distribution portal, Rifkin (1999) writes: “The Napster decision represents a turning point for dot.com commerce. What we’re witnessing is the beginning of a struggle between two great economic systems. On one side of the divide lies the old market-based economy, made up of sellers and buyers. On the other lies the new network-based economy, made up of servers and clients. In markets, the parties exchange property. In networks, they share access to services and experiences.

The new information and telecommunications technologies, e-commerce and globalisation are facilitating a new economic era. By the middle of the 21st century, markets, the hallmark of conventional capitalism, will have largely disappeared, replaced by a system based on network relationships, contractual arrangements and access rights.

There are a number of reasons for this. First, the near warp-speed of distribution and exchange on the Web makes direct market-based transactions too slow. With a simple click, one can distribute music around the world and exchange whole libraries of songs before a cash register can even ring up a sale.

In networks the emphasis is on minimising production and profit is made by pooling risks and sharing savings. Everyone in the Napster network swaps music with each other”, etc.

Much of this philosophy will enable the dynamic commercial development of DISSEMINATE, which could also generate advertising opportunities. The development could also be linked to an Authors Co-operative Portal (initially for language learning).

8 Conclusion

The foundations of this project were first outlined in a private list communication in late 1997 – which, by coincidence, corresponds to the first registration by anyone of a

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DISSEMINATE world domain (October of that year), the .COM site which simply provides a black screen with a definition of the word lifted from a dictionary now accompanied since 23 October 2000 by a number of historical pictures. The concept appeared then, even to the first author, to be unrealistic and utopian.. The first formulation of a different smaller acronym (five letters) reflected the sense of utopia: the concept might well have been described then as the CAL(L) Esperanto (found in the title of the first oral presentation at the WorldCALL conference – `http://www.hlc.unimelb.edu.au/worldcall/str2.html`). Although we would not pretend that the project will definitely result in a full scale product, we now think that it has matured into a much more realistic and purposeful solution to the delivery of real interactivity in language learning on the Web. Even if DISSEMINATE, through lack of successful funding from public or private sources never sees the light of day as a distributable proposition, it is hoped that the issues raised in developing it will shape the development of what we might then feel entitled to call Web-enhanced Language Learning or Web-based Intelligent Language Learning. We may even venture to say that the project is eminently more achievable than either the real success of the Esperanto language or the GNU/Linux development. The next five years will provide the answer. If DISSEMINATE succeeds, it will perhaps constitute a 'New Point of Departure in CALL for the Year 01'.

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Additional inclusions

Su White provides a good listing of on-line learning environments:
`http://ecs.soton.ac.uk/~saw/`

A comprehensive survey of on-line environments is found at: `http://multimedia.`

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marshall.edu/cit/webct/compare/comparison.html

A new product, Learnwise, has been developed under the supervision of Steve Molyneux, Microsoft Chair of Advanced Learning Technologies at the University of Wolverhampton; it is now marketed by Granada-Learning and appears to have been designed as an author and user driven tool. Details can be found at http://www.learnwise.net/ This is too recent to have been covered by the above US based survey, this product has received (at least indirect) funding and consultancy from Microsoft who were previously involved in a different development, called Lyceum, a popular brand name for educational and e-learning solutions, also adopted for a different project by the Open University in the UK.

A useful Web learning portal is found at http://www.outreach.utk.edu/weblearning/

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