

Adaptation of courses for trans-European tele-learning

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Abstract This paper addresses the problems of adapting instructional *courses* for trans-European tele-learning and for enlarging the range of students and learning modalities in distance learning. Building on previous work on the portability of educational *software*, the paper examines various dimensions of adaptation of existing courses: (a) content, (b) instructional materials, (c) language issues, (d) instructional delivery, (e) the instructional setting of the course, and (f) the situation of the course in a programme of study, and considers how those dimensions will particularly affect course adaptation. From this analysis, a set of six guidelines is presented for course adaptation. The Commission of the European Community recently supported a trans-European project, TeleScopia, which aimed at investigating these dimensions as research issues.

Keywords: Adaptation; Trans-European; Tele-learning

Introduction

Making learning resources more accessible and flexible are major rationales for trans-European tele-learning (Van den Brande, 1993). Although in some cases an institution may design a course from the start, the most common procedure will be consider the adaptation of an existing course so that in some way it becomes more appropriate for a trans-European audience and for the incorporation of some aspects of tele-learning. Which courses are good candidates for such adaptation? If a course is a good candidate, what are guidelines for efficient adaptation?

These questions were systematically considered in the TeleScopia Project, a joint initiative of three directorates within the Commission of the European Community. In this project, course providers from universities, training centres and commercial training agencies were given the opportunity to adapt some of their existing courses for more-flexible trans-European delivery. A group of researchers from five countries was part of the project, using it as a framework to study including the following research questions:

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What are major factors to consider in adapting courses for trans-European tele-learning?

What are guidelines for the adaptation process?

The purpose of this paper is to summarise the theoretical work that has been done in the TeleScopia Project relative to these questions. This process began by an analysis of the extensive experiences that have already taken place with respect to the trans-European adaptation of educational software. These educational-software findings were applied to the course-adaptation process. From this analysis some guidelines were proposed to course providers for the trans-European tele-learning adaptation process.

Lessons from the educational-software adaptation experience

Educational software has been extensively studied in terms of increasing its portability, or capacity to be used in settings other than that for which it was originally made (see, for example, a recent summary in the European context by Aston & Dolden, 1994). The motivations for this are economic, educational, and strategic (Collis & De Diana, 1990a). Broader use of a product reduces the overall cost margin, increases its return to its producers, and stimulates a stronger market for such products (Oliveira, 1990). Educational motivations relate to the desire to extend access to an effective resource and to learn from the experiences with that resource in different instructional settings. Strategic motivations relate to the wish to extend more-equitable access to computer-based learning materials in order to address concerns of inequitable opportunity in access to such materials because of geographic or demographic circumstances.

Portability thus relates directly to adaptability: educational software needs to be adapted in various ways in order to be used in different cultural and educational contexts. There have been many research initiatives studying these various ways. For example, in a series of 'Summer Universities' sponsored by the Commission of the European Community in 1987 and 1988, educational software-development experts from throughout Europe were brought together to find common paths towards more-portable educational software and the creation of a common market for these adaptable programs. The conclusions of this work were that the major problems to be confronted were:

- problems of vocabulary;
- semantic problems;
- problems of culture and environment;
- teaching-style differences;
- problems related to the 'ergonomic necessities of different languages';
- technical problems related to different computer platforms;
- computer-language problems;
- problems related to the lack of standard interfaces and module libraries.

(Ballini & Poly, 1988)

Collis and De Diana, in their 1990 review of the international literature concerning educational-software portability, found lists of factors such as the above appearing as results from many different projects. They grouped the factors into four clusters: technical, educational, social/cultural, and organisational and then invited specialists from eight countries to elaborate on the factors (Collis & De Diana, 1990a,b). Their results from this 1990 analysis have been replicated in more-recent reviews (Aston & Dolden, 1994; Gjørting, 1994; Collis, 1995a). The general conclusion of these different analyses is that technical issues relating to adaptability are being solved by the evolution of the computer industry itself, but educational, cultural, and organisational issues remain challenging.

Technical factors influencing educational software portability

Much progress has been made on the technical aspects of educational software portability, partly because of general developments in software engineering and in computer technology itself and partly because of many different projects investigating educational software portability from a courseware-development perspective (see, for example, Fletcher, 1992). Issues relating to adaptation for different languages are particularly well studied, ranging from anticipation of different alphabets to the problem of adequately translating technical terms and local phrases (see, for example, Kearsley, 1990, for an overall summary and Nielsen, 1990, for a particular focus on language issues relating to the user interface of software). Griffiths *et al.*, 1994, illustrate the current state of techniques in their example of adapting an educational program originally produced in English to Catalan and Bulgarian. The evolution of the software industry itself, with object-oriented programming, standard conventions in graphic-user interfaces, a near-universal windows-based environment, the convergence of the field around a limited number of platforms and operating systems, and the dominance of a few major software producers in the market setting *de facto* standards for new software products; all these are providing solutions to many of the problems dominating the attention of those involved in educational software adaptability in the 1970s and 1980s. While technical problems relating to adaptability are not solved, they have been considerably reduced (see Collis, 1995a, for a more-detailed summary).

Educational factors influencing educational software portability

Critical educational factors affecting the portability of educational software include discongruities between originating site and receiving site in:

- educational need and relevance;
- curriculum;
- instructional approach;
- tone and style of instructional interactions;
- classroom context variables;
- teacher-related characteristics.

There is abundant evidence that a less-than-optimal match between local conditions and original design decisions in a software package will result in teachers not using the package. The educational, as well as cultural, characteristics of the particular program are so deeply reflective of their original setting that adaptation would mean production of an entirely different program (Murray-Lasso, 1990).

Rejection at site relates not only to international-portability contexts, but also to instructors within the original group for whom the software was made. For example, a recent analysis of university faculty, all in the same country, all teaching a common, standard course in statistics, and all using the same textbook, found that the majority of the instructors failed to make use of the educational software included with the textbook for supplementary practice (Vernon, 1993). The reasons for this lack of instructor uptake involved a range of items including lack of motivation, lack of perceived need, and difficulty in providing student computer access.

Vernon's example relates to a situation where the curriculum fit of the software was clear and the instructional style embedded in the software was not a problem. In most portability situations, such as those described by Murray-Lasso, these two aspects are indeed problems and major deterrents to educational-software portability. As an example, a decision was made by the Commission of the European Communities to fund a project involving educational experts from Italy, Spain, and Portugal on the development of a common software package for use in geography teaching. "However, great difficulty was experienced in finding an area of work relevant to the teaching of geography as it is practised in all of the participating Member states" (Commission of the European Communities, 1992, p. 13). Not only content but differences in methods of teaching and expectations for student performance stymied the project; the project resulted only in a general-resource database.

From the accumulated experience, a general conclusion has been reached concerning the portability of educational software from an educational perspective: "the less structured or didactic the program the more usable it is in other systems" (CEC, 1992, p. 13). The problem with this however, is that less-structured products such as those that have the characteristics of educational tools or explorative environments are also the most complex for instructors to use in that they often require the instructor to adapt his or her teaching practice and even philosophy in order to be integrated effectively into practice (see for example, Nagtegaal, 1990; Veen, 1994). Collis *et al.* (1994), after a series of international studies relating to software support for elementary electronics instruction, identified 'workbench' type programs (i.e. electronics workbench, chemistry workbench, graphing environments for mathematics: software environments that allow simulation and experimentation in subject-specific contexts but are open to use based on the teacher or local instructional materials) as perhaps the best compromise between open- and more-structured educational software.

Social/cultural factors influencing educational software portability

The adaptation situation becomes even more complex through the interaction of educational factors with social/cultural aspects. Not only is there an "inadequate relationship between pedagogic demand and technology offer" but also "the problem is at the curricular/applications level and the way in which this interfaces with the broader social conditions within which such (portability) activity takes place" (DELTA OSIRIS, 1989, p. 22). Socio-cultural aspects include such obvious aspects such as issues related to identity and tone and style of interaction, but also to socio-psycho-logical aspects such as the 'not invented here syndrome' as well as to cultural differences in the interpretation of visual images in software and of symbol interpretation (Russo & Boor, 1993). These cultural aspects effect user-interface portability significantly (Nielsen, 1990).

Language is more than a technical problem confronting educational-software adaptability, in that different languages represent people with different cultural roots and backgrounds and styles of communication. Despite considerable research in educational science more generally, the problem of effective design and adaptation of learning materials for multi-cultural use, even sometimes when the users speak the same language, remains a challenging one (Banks, 1993). Innovations in educational-software technology, such as the ability to offer a variety of languages to accompany learning materials through increased storage facilities (for example, CD-ROMs) still are shaped by basic cultural differences in the way people communicate with each other and about learning situations (Nakajoli, 1993).

Organisational factors influencing educational software portability

Socio-cultural aspects also influence the fourth category of factors identified by Collis and De Diana (1990a) as effecting educational software portability — a broad category described as organisational influences. Organisational influences include decision-making procedures in the receiving site as to what products are acceptable for local purchase and use, copyright and ownership issues, marketing and distribution issues, maintenance considerations, issues relating to preference for local sources rather than external sources, as well as cost-related considerations. A recent project, European Pool of Educational Software, gave extensive consideration to overcoming many of the organisational problems that can hinder educational-software exchange (Aston & Dolden, 1994; Gjørting, 1994). Although the Project resulted in 22 educational-software packages being chosen for 135 subsequent national adaptations, the management, organisation, accommodation and travel costs associated with the Project were substantial. It is not clear if countries would consider the portability exercise important enough to finance their own costs of participation and the costs of the central organisation of such an initiative if it were not supported by special project funding.

Software portability: conclusions

From the various analyses, major conclusions for the design of software to increase the likelihood of adaptability and thus of portability, are:

1. Use technical tools and methods such as object-oriented programming, graphical user-interfaces, and standard windows environments and utilise industry-wide standards.
2. Choose candidates for adaptation with great care, for example, preferring a workbench-type package for a non-culturally specific subject such as introductory electronics or chemistry, etc., to a program with a more-structured instructional design.
3. Be sensitive to cultural differences, which includes but goes far beyond issues related to language translation; and
4. Ensure the adaptation process itself has adequate organisational support, to provide an infrastructure for the adaptation activities and to bring together the parties involved in the adaptation.

Can these guidelines for adapting educational software for cross-cultural use be applied to the adaptation of courses involving a variety of media and technologies?

Adapting courses for trans-European tele-learning

From work within the TeleScopia Project, it is argued that the above factors relating to the adaptation of educational software for use in settings different from those for which the software was developed are relevant to the broader framework of adapting courses for trans-European acceptance. The adaptation of courses is considerably more complicated than the adaptation of educational software, in that many more components are involved. The adaptation process can be focused on taking an existing course and adapting it so that it can be offered to a more-diverse group of learners (as is the case in increasing the trans-European range of a course), or on making additions to an existing course in order to enrich or expand its aspects and possibilities (as is the case by adding the new educational possibilities of tele-learning), and combinations of both. With respect to *trans-European delivery*, the existing course may or may not have been designed for cross-cultural participation, or may not have anticipated the range of cultural and national settings to be served in the adapted course. With respect to *tele-learning*, the existing course may not have involved distance delivery, or may not have involved both the synchronous and asynchronous forms of distance interaction, or may not have involved the addition of communication and group discussions particularly among those not sharing the same mother tongue.

In distance education, the adaptation of learning materials (predominantly print) for use in different learning contexts has been long studied (Potter, 1990), but adapting entire courses for trans-European tele-learning will involve not only the adaptation of a range of learning materials but also adaptations related to course content, instructional delivery, and institutional organisation of the course as a whole. These in turn will require

substantial adaptation by the tutor and adjustments by the learners. Each of these aspects must be adapted if the course is to succeed in a more-flexible trans-European tele-learning context. The experiences from educational-software portability can be paralleled here, relative to the perspectives of content, instructional materials, language, instructional delivery, and institutional setting and legitimisation.

Content

Students do not take courses in isolation; courses fit into an instructional sequence and assume prerequisite skills and understandings. Just as it is difficult to find a match between course content and educational-software content, so too is it difficult to find a match between course content and the surrounding educational experiences of students in different institutions and from different backgrounds. Among the responses to this problem are: to choose courses that are relatively standard in content across settings (i.e. English as a second language for professionals, introductory electronics, C+ programming); to aim at students at a specialist level so that common background knowledge can be expected (i.e. senior engineers in a specialist area); or to choose courses of topical interest not likely to need to fit into existing study programmes but still relevant (i.e. learning to use the Internet, improving French-language skills).

Another approach is to develop courses in a more-modular form, so that students can be flexible in choosing portions of the course content relevant to their own needs. For this to occur, however, substantial work must be done not only in creating well-designed modular materials that can stand apart from each other, but also in many other interrelated aspects, such as providing a standardised way for description of these modules so both students and their home institutions can determine in advance the relevance of the content of the module and the fit of the module into the requirements of the home institution. Modularising courses brings in many other issues: the effect on course evaluation, on subsequent sequencing of content in the course, the continuity of the course as a whole, interactive learning experiences with other learners, the effectiveness of tutor support, the institutional arrangements for giving credit for the course, the costs of the module. All of these aspects must be redesigned in an integrated way if a course is to be offered in a modular fashion.

Instructional Materials

All of the issues relating to educational software adaptation are relevant to the adaptation of instructional materials for more-flexible course delivery, with the extra complication of the fact that not only one type of medium will be involved, as was the case with educational software, but many, and thus also many different kinds of medium-by-delivery-channel possibilities. The technical skills, training, and equipment needed to adapt computer products

are different from those needed to adapt television broadcasts, videotapes, audiotapes, or textbooks for cross-cultural use.

There are a variety of strategies to guide the adaptation process by which existing learning materials can be tailored to fit local needs, such as expert appraisal and learner verification with small groups of representative learners. However, it is not likely that course providers will have the time or budget for such procedures. The costs of the delivery of the course and its particular features (such as computer conferencing) do not allow extensive validation testing with a few subjects; innovation must take place with a regular cohort of students within the confines of the existing timetable, curriculum and institutional organization. The best that can be done is to seek expert advice and to try to capture relevant observations during the course delivery itself for future course adaptation.

Instructional materials must not only be adapted for language, social/cultural aspects, and content flexibility, but also to reflect the new didactic possibilities made available by telecommunications as part of course delivery. Telecommunications is not only a delivery channel but also allows new forms of instructional approach, requiring subsequent adaptation of other course-material components. Riel and Harasim (1995), for example, identify a range of enrichments and enhancements that telecommunications can bring to the instructional design of a lesson or course, including: cross-group collaboration, moderated collaborative projects, teleapprenticeships, telepresence in different learning settings and learning environments, professional networking, access to remote experts, access to remote resources, moderated debates and conferencing. These didactic forms cannot be just added on to a course; at least some of the other course materials must be also adapted to bring about their integration. The addition of computer conferencing to a course, for example, is only effective to the extent to which the instructor integrates it with other aspects of the course, including other instructional materials (Mason, 1994).

Language

Language is a core problem in adapting materials for trans-national use. If the learner cannot read the materials from another country, if he cannot understand what is being said in a conversation, then clearly he is shut out from participation. Particular strategies can be used to deal with the multiple-languages problem of trans-European courses, even more than were available to educational-software adaptation because with courses involving tele-learning not only written language is involved but also oral language and also a larger variety of media (not only software) can be employed. There seem to be, in principle, four general options for addressing the many-languages problem:

1. *Use a single language as 'lingua franca'.* Choose one particular European language and construct all learning materials and systems using this language. The obvious choice is likely to be English, as 85% of Europeans who learn a second language learn English as that second

language. Some countries (especially Northern Europe) have already adopted policies that favour the general knowledge of English as a second language. In other countries, however, this option would be more of a problem and also involve cultural and political objections.

2. *Use low-level technological solutions.* Translate learning materials and use subtitles in video and broadcast materials. While a familiar approach with well-tested solutions, it is an expensive approach and inefficient. Furthermore it appears to be restricted to written language and it cannot solve the problem of oral communication among people speaking different languages.
3. *Use high-level technological solutions.* Include strategies such as automatic translation, computer-based dictionaries, and computer-assisted translation. However, such solutions are still of limited availability and still too experimental to be of practical application in course adaptation.
4. *Turn to visual communication.* Use visual communication as a substitute for verbal communication whenever feasible. Visual communication includes static and dynamic images, graphs, icons, manipulation of visual information, and visualised results from simulations. As visual communication is becoming an increasingly important communication medium in science and technology as well as mass media and entertainment, augmenting the role of visual communication in learning activities can have strategic value as well.

The particular complications of oral communication compared to written communication add other layers to these considerations. The use of video-conferencing for example requires oral interaction, thus making Option 2 above not feasible and Option 4 less-easy to implement. Option 1 would seem the major strategy, but the fact that conversation must take place in a second language may inhibit the desired communication flow made possible in theory by the telecommunications solution.

Instructional delivery

Tele-learning requires new strategies for educational delivery, strategies for which a pedagogy is only beginning to emerge. There is considerable experience with different forms of interactive television (including one-way video, two-way audio and two-way video, two-way audio; see for example, Bates, 1993) but bringing interactivity to broadcast video (or radio broadcasting) is now possible through a wider range of interaction channels than ever before, including not only telephone, but videophone, fax, desktop conferencing, and asynchronous computer conferencing. Adapting courses to offer interactivity through these different communication channels will require new pedagogical skills on the part of the instructor. For example, the instructor may also have to become a moderator of distributed, asynchronous discussions, requiring didactics for which he has no model or experience (Mason, 1994). If the instructor must develop these skills at the same time as handling communication in what is not the mother tongue for many of the participants (or even for himself), an additional burden occurs.

And not only what is said is affected by cross-cultural differences in communication: Nakajoli (1993) is among those considering the implications of cross-cultural communication for the user interfaces supporting on-line communication and sharing of resources. Changes in instructional-delivery practices when coping with new technologies are frequently difficult for instructors regardless of these extra burdens, and require a willingness on the part of the instructor to change his or her typical pedagogical approach, something which is a factor of personality and personal incentives as well as subject-area characteristics (Veen, 1994).

Institutional setting of the course

Increasing the flexibility of courses on a trans-European basis involves the range of home institutions whose students will be involved in a course and the range of home settings in which the students study and work. These in turn will involve a broad range of different styles and practice with respect to how and when students can access study resources, if students tend to work individually or co-operatively, if students can be flexible in their own study and course-participation times, and the sort of evaluation framework in which the home institution expects the student's performance to be measured. It is clear that every educational institution has its own particulars with respect to course timetables, student study and work expectations, student-support provisions, student information-acquisition possibilities, students' learning environments, and student evaluation methods. When the expectation that students will also be able to access telecommunications facilities is added to the picture, the complexities of fitting a course to the home and institutional settings of the students increase substantially (Collis & De Diana, 1994). Thus the components that increase the flexibility of a course in theory, such as those in which telecommunications can allow flexibility of time and place for course participation, are bounded by the flexibility available in the local situation.

One important aspect of course organisation relates to the agency or institution that serves as the broker, or contact person, for the distance-delivered course at the home institution of the students. A TeleScopia preparatory paper by Manninen (1994) discusses the Finnish experience with material brokering and organisation by the broker of local tutoring and mentoring. She notes the distinction between expert tutoring, relative to the content being studied, study counselling, and technical support, all of which are necessary at the local level. In particular, she notes that understanding of cultural differences must be a key to the various types of support. One tool to help this understanding is the provision of "cultural memoranda", summaries of practical information about cultural aspects of the different countries involved in the trans-European tele-learning situation.

Situation of the course in a programme of study

Finally, all the above components come together when a course offered via trans-European tele-learning must fit into the programme of study for its various distributed participants. The complexities in fitting a course, with its context and delivery requirements, into the programmes of study in various educational institutions, so that the course is more than a special experience or an enrichment option, are considerable, and have not much yet been overcome. There is more success with courses aimed at professional education (for example, offering English to various professional groups, Reif & Fischer, 1994) than there appears to be at developing courses for trans-European tele-learning that are accepted as satisfying the requirements of the various programmes of study in the different universities of the participating students.

Recommendations for adaptation of courses

In order to make a concise set of recommendations for the adaptation of courses for trans-European learning, we can build on the summary of recommendations for more-portable educational software developed earlier and reconsider each point relative to this broader context:

Guideline from educational software adaptation:

Provide technical support and utilise industry-wide standards and technical developments.

Application of the guideline to course adaptation:

The environments becoming available via advances in communications technologies and the integration of technologies within the desktop have the advantage of offering many new possibilities for tele-learning but the disadvantage that no standard user environment has yet emerged. This means that even computer conferencing software, which has a relatively long history compared to desktop video and document-sharing software, still is unstable in terms of user-interface guidelines and core functionalities (De Vries, 1994). The integration of media and delivery technologies is also an emerging area technologically; thus many implementation problems can be expected for the new tele-learning course. A guideline here, based on past experience with computer technology, is:

Guideline 1: Budget for a technical specialist from the host organisation, familiar with the new technologies, to go to the receiving sites, personally configure and test equipment and software, and remain with the users until some trial runs of interconnectivity have occurred. Following this, the technical specialist should be available, via desktop conferencing, for help and trouble shooting, throughout the course period. This provision is a substantial budget item, but defensible. If the host site cannot afford this, each local site must make a comparable effort to support ongoing technical support before and throughout the course. Local instructors in particular need some

preliminary experience with the technical environment before the pressures of actual course delivery begin.

Guideline from educational software adaptation:

Choose content with culture-neutral aspects

Application of the guideline for course adaptation:

With regard to trans-European tele-learning, the translation of this guideline should also involve anticipation of the opportunity to exploit the cross-cultural dimension.

Guideline 2. Choose course content where the cross-cultural aspects of trans-European participation are either of minimal relevance (thus highly specialised courses or courses relating to a common trans-border phenomenon such as learning to use the Internet) or courses where the cross-cultural aspects are integral to the content (i.e., Methodology courses for instructors of foreign languages; courses preparing persons for internationally oriented work experiences).

Guideline from educational software adaptation:

Handle language and communication expectations with great care

Application of the guideline for course adaptation:

Language issues and cultural sensitivity pervade every aspect of trans-European course success. In particular, the following guidelines can be suggested:

Guideline 3. Do not assume the course will be improved by communication and interaction, unless these can be carefully handled to deal with the extra burdens they bring from the cross-cultural perspective. Requiring learners to talk with each other in a common language, as is the case with video-conferencing, will put strain on those learners. Thus, unless the communication is valuable to the goals of the course and carefully handled, it will limit participation in the course. With respect to the tele-learning aspects, pay particular attention to the benefits vs the costs of adding various real-time and/or asynchronous interactions to the course content. When communication is asked of learners, it should be clear who is chairing the discussion, how the interaction is to occur, what the aim of the interaction is, and who the communicators are.

Guideline 4. Give explicit attention to the problem of using a course in a country where a different language is spoken from the language used in the course. Examine the specific communication problems that can arise given the characteristics of each course (its target students, type of content to be communicated, specific communication modalities). Be sensitive to the particular problems of cultural differences in communication styles when asking students to have real-time or asynchronous discussions. The decision to use a common language may have to be balanced through the provision of local support in the mother tongue of the students, although such a

provision immediately involves cost and organisational issues. Thus, in each component of the local support and brokerage involved with a distance-delivered course, bring important cross-cultural differences in approach and style to each local agent's attention.

Guideline 5. Be alert to the use of visual communication in place of text when feasible. However, visualisation is also culturally sensitive. As much as possible, provide for expert review and some local verification of the learning materials and process (with opportunity for revision) before full-scale implementation.

Guideline from educational software adaptation:

Support personal contact among the adapters through an adequate budget and infrastructure for communication

Application of the guideline to course adaptation:

This guideline is particularly hard to facilitate when adapting courses for trans-European delivery, given costs and scheduling issues involved in bringing those involved in the adaptation process face to face with one another. And even above the importance of face-to-face sessions for the adapters, there should also be provision for the course providers to interact with each other between face-to-face sessions, using conferencing. This means in turn that a good moderator is necessary for the course providers even before any students are involved, and also that the project provide incentives for the time and effort involved in this support-level interaction. Thus the last guideline is:

Guideline 6. Stimulate the course providers to discuss with each other on a regular basis and using the technologies they will be or are using for the tele-learning courses, their experiences in course adaptation and delivery. This requires budgetary support for convenient access to good conferencing equipment for the course providers, a well-trained moderator to steer the discussions so they are seen as productive, and budget and planning within the entire enterprise to facilitate this development of a sense of a learning community among the course providers themselves. From the local site, this requires stable assignment of responsibility for the course, and local support and time for this reflective communication. The core site for the course as a whole (or the project manager in the case of a tele-learning project) should organise the course-provider support strategy as much as possible and as early as possible for the participants.

The above six guidelines seem important for the adaptation of courses for trans-European tele-learning. But are they feasible?

Experiences from the TeleScopia Project

The TeleScopia Project has shown these guidelines to be valuable, although not always practical to implement. For example, with Guideline 1, when

learners were expected to organize their own installation and connection solutions for computer conferencing, considerable frustrations and difficulties occurred. One of the goals of a trans-European course provision — to stimulate broadscale participation among geographically dispersed learners — means at the same time that it is economically and practically not feasible for the course provider to support individual learners in their local software- and modem-installation needs. Also, Guideline 6 was difficult to implement even in the special-project framework, in that the busy schedules of course providers meant that little time, and motivation, could not be found to discuss experiences with each other. Guideline 2 was well followed in the TeleScopia courses, as each dealt with a topic that was either trans-national in focus (environment issues at the international level, innovation management from an international perspective, accounting procedures for trans-European business), designed for an trans-national audience (English or Greek for non-mother tongue speakers), or culturally neutral (telecommunications networks). Guidelines 3 and 4 relating to language and communication, were major focuses in the TeleScopia courses, with the solution most frequently chosen to have all course communication in English as a common language, but with translation of text and video materials into various languages occurring in some of the courses. In some of the courses, learners welcomed the opportunity to practice their English skills, but it is not clear overall to what extent the expectation of bi- or multi-lingualism was a deterrent to learner participation in the courses. Guideline 5 relating to using additional visual representation as an alternative to text, was not incorporated by any of the course providers; they generally responded to the adaptation opportunity by looking for ways to increase communication among course participants rather than by re-working their instructional materials. A major exception to this was one of the courses, revised for delivery via a World Wide Web site. However, this revision did not include the incorporation of visual materials; the WWW site was used for provision of additional English-language text materials as well as for communication among the participants.

All of the TeleScopia courses had already been adapted for some aspects of distance delivery prior to their involvement in the project; thus course adaptation was not as conceptually difficult as if courses developed for face-to-face delivery had been involved. Thus the cost and time aspect of adaptation could not really be addressed*.

Conclusion

From the considerable experience that has accumulated with respect to the adaptability and portability of educational software and other learning

* For a full discussion of the adaptation of the TeleScopia courses, see Collis, 1995b. For the overall research summary of the project, involving many issues such as the costs and pedagogical flexibility of the courses, see Köhler, *et al.*, 1995. Both reprints available from the Project management, TeleScopia Project, Deutsche Telekom AG, Generaldirektion, Freidrich-Ebert-Allee 140, D-53113 Bonn, Germany.

materials, and more broadly with respect to the compatibility and transferability of courses in both distance-education and traditional education, adapting courses for multi-cultural, multi-organisational, multi-media use will be challenging. Telecommunications technologies offer important possibilities for making more-flexible trans-European training and learning feasible. However, before a future with more-flexible learning can be realised, much must be learned about strategies for adapting existing learning materials and courses for more broadscale and flexible use. The TeleScopia Project has offered a testbed in which advanced telecommunications platforms were available so that this adaptation process and the subsequent deployment of its adapted courses could be studied in a systematic manner under optimal technological conditions. As is the case with educational software, it is expected that the technical problems facing adaptation of courses will be solved more quickly than the social/cultural and organisational problems facing acceptance of the courses in real practice (Bork, 1976; Kohler, 1995). The guidelines suggested in this analysis will be under particular scrutiny: Can they help the course-adaptation process for trans-European tele-learning?

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