

Untangled web: developing teaching on the internet

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For Maureen, Jon and Norksy,
and not forgetting Anne and Bill

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Abbreviations

The following abbreviations have been used in this book:

CGI	Common Gateway Interface
FAQ	Frequently asked question
GIF	Graphics Interchange Format
HTML	Hypertext mark-up language
IR	International relations
ISP	Internet service provider
IT	Information technology
JPEG	Joint Photographic Experts Group
ODL	Open and distance learning
URL	Uniform (Universal) resource locator
WBI	Web-based instruction
WYSIWYG	What You See Is What You Get

A note on web references

The authors have cited many online articles or useful web resources, quoting the relevant URL. As web addresses often change when sites are reorganized, you may find that some of the URLs have expired and no longer lead to a page. If you experience this, try deleting successive parts of the address from the end and this may return to a menu higher up the structure of the site. You can then look out for the article or section cited. Alternatively, use only the root of the address (the part before the first 'forward slash'). This will, in all probability, find the home page of the site, from where you can look for, or conduct a keyword search for, the relevant information.

introduction

introduction

'Begin at the beginning' the King said, gravely,
'and go on till you come to the end: then stop.'

Lewis Carroll *Alice's Adventures in Wonderland* (1865)

The use of the web in teaching and learning within higher education is now commonplace (Whittington and Campbell 1998). For many teachers using the web in their courses simply means converting their handouts and booklists into HTML, making use of conferencing facilities or providing 'hotlists' of relevant sites. This book shows how educators can go further than this and use the web for delivering stand-alone or integrated teaching packages into their courses. We draw upon our own experiences developing our own web-based instruction (WBI) packages. Khan (1997a: 5) defines WBI 'as an innovative approach for delivering instruction to a remote audience, using the Web as the medium'. We use WBI throughout this book by way of shorthand but would expand Khan's definition and argue that our web-based products go further than simply delivering instruction.

Before we proceed a couple of questions need to be addressed. First, what does it mean to talk of the 'challenge of the educated web?' (Carty 1998). Second, in such a context, why is this particular book needed/how can it help you? In answer to the first question, there is now almost a generalized belief that technology can make academia more accessible, affordable and effective but that this will need changes, probably quite profound, in the use of teaching time and other resources, as well as in the roles of staff and even in the institutional mission itself (Hill 1997; Van Dusen 1998). At the so-called 'chalk-face', models of teaching will have to be changed away from a transmission model to one which is 'much more complex, interactive and evolving' (Sherry 1996: 342). For many teachers this will not be a comfortable change and they will require support. In answer to the second question, there are clearly lots of choices to be made in answering the challenge of the first question. There are many questions to ask and considerations to be made, which amount to cost benefit analyses (Freedman

1995; Potashnik and Capper 1998). However, thus far, it could well be argued that 'internet-based courses usually take more time, expertise and money than expected and deliver somewhat less than is intended' (Levin 1998) and that to date costs have outweighed benefits. As other authors put it, 'the problem with technology driven innovations is that they can consume prodigious amounts of time and money to little educational effect' (Ward and Newlands 1998: 171). Initially, we are attempting to make web-based teaching possible for the vast majority.

However, it is necessary to go beyond such ambitions. Most applications of the web so far have been somewhat crude through lack of reflection on the principles of learning and/or lack of skills in terms of using hypermedia and multimedia (Maddux 1996). The idea of 'instruction' has been defined by Ritchie and Hoffman (1997: 135) as 'purposeful interaction to increase learners' knowledge or skills in specific, pre-determined ways'. In this context they argue that publishing a web page with links to other digital resources does not, in and of itself, constitute the essence of teaching. However, those things that do – motivating the learner, specifying what is to be learned, prompting the learner to recall or apply previous knowledge, providing new information, offering guidance and feedback, testing comprehension and supplying enrichment (Dick and Reiser 1989: 135) – can 'with forethought...be incorporated in instruction designed for delivery on the World Wide Web'. This book is needed, then, to help actualize some of the web's potential in teaching. Since 'progressive teachers who are the early adapters of technology can become change agents for their peers' (Sherry 1996) it is hoped that a snowball effect can be set up.

However, there is a further important reason. On the topic of open

and distance learning (ODL) on the web, it has become quite common for people who have done it to write short articles for other (knowledgeable/technically literate) people describing how they have used the web for open and distance learning and what the results have been (Barker 1998a). Such articles assume technical knowledge and, though they describe quite often encouraging or exciting outcomes (Pohan and Mathison 1998), they often leave it to the reader to get this knowledge themselves if they want to follow suit (Tuathail and McCormack 1998). What this book is seeking is the describing and prescribing of a route through the whole developmental process of setting up ODL web pages. In fact, to use this book you do not even need to have the experience of setting up your own web page, though it may require more time and patience for those with only a rudimentary knowledge of IT and web-based technologies. In other words, we do not just discuss why the web is useful for your teaching (see Leu and Leu 1999) but how to make it so. The value of such a work has been recognized elsewhere, for instance in the setting up of web pages produced at Aberdeen University; despite the use of various guides to writing for the web, a great deal of time was spent trying to discover exactly what to do in different situations (Ward and Newlands 1998).

Before going any further, a brief examination of terms will be useful. Open and distance learning implies that the learner will be able to receive and access information and guidance without geographical proximity and that access to this type of learning will be, in some sense, wide. In fact, the technological requirements of some types of ODL have led people to fear that learning may become less open in the sense of restricted to fewer people (Kearsley 1998; Yeomans 1998). On the other hand, openness can be defined more in terms of time and therefore access to learning

resources. Though not unconcerned by the implications of anything that might be seen to make learning more elitist, here we deal with ODL mainly in terms of increased access, spatially and temporally. There are additionally a whole host of terms which crop up in seeking to describe new pedagogical approaches informed by technology of some kind or another. Hence terms like resource-based learning, electronic course delivery, net-based learning and so on. Rather than attempt detailed definitions of such terms, this book seeks to explain things carefully, and where confusion is possible, include terms in a glossary.

Though you need not have done so, setting up a web page is now quite a common thing to do for individuals, university courses, companies and so on. The internet is vast; a 'global, publicly accessible communication network that connects together numerous people, groups and organizations in many different countries' (Barker 1998a: 4). However, one side effect of this proliferating activity is that there is now a huge amount of material available on the internet. Furthermore, the growth of information has, to a certain extent, taken people by surprise (Maddux *et al.* 1999). Though the internet was initially heralded as a solution to all sorts of learning and teaching problems, the potentials and problems of such a large amount of information are acknowledged, at least implicitly, by an increasing number of academics (Graham, McNeil and Pettiford 2000). One particular problem is that the quality of existing pages varies enormously (Boshier *et al.* 1997). This huge quantity and range of materials must be tailored and contextualized if it is to support teaching effectively (Shipman *et al.* 1997). This book is, at one level, suggesting a solution to these problems of quantity and quality by helping academics to bring some order to the chaotic world of the web through a series of interlinked and selected web pages which

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will enhance the student learning experience and staff teaching experience.

This is a guide which takes you through various stages of preparation in order to incorporate into your teaching not just a web page, but a fully integrated, interactive, multimedia package with the potential for (organic) growth. This approach seeks to improve upon, though does not supplement, the conversational model of learning which is, the authors would suggest, what universities should be aiming at. In effect, this book makes a contribution towards the notion of supported open learning (Daniel 1999).

If this mix of techno-pedagogy jargon is already too much, it should be re-emphasized that you can use this book in a practical manner as a sympathetic guide through this. It will achieve its aims in a way which will make a web-based approach possible for individual academics, courses or departments with quite limited skills and knowledge in the IT realm. Furthermore, whilst the time and money saving aspects of the web have been overstated, this can be done without a huge increase in resources (Kapur and Stillman 1997). All too frequently, technology-based projects end up mystifying any prospective audience. However, for those requiring a basic guide to using the internet, or who would like one to use alongside this work, a good place to start is Stein's (1999) *Learning, Teaching and Researching on the Internet: A Practical Guide for Social Scientists*. Furthermore, there is a whole range of literature related to the simple use of the internet in learning and teaching (for example, Brooks 1997). Apart from some traditional, conservative attitudes to university pedagogy, the lack of institutional and instructional computer support is, we believe, discouraging attempts to utilize the more systematic use of the

web in teaching because of difficulty and frustration. Many universities are failing to get the message regarding incorporation of technology (Daniel 1996) and many staff are left on their own. Whilst others have reported briefly on successful attempts to use the web in ODL projects (see also Riley 1998), this book is a practical attempt to circumvent some of the problems which are frequently associated with institutional inertia, either intellectually or financially based, so that this form of teaching might become a much more frequent occurrence.

Having said that, this book takes you through a full developmental process, although, in another sense, it is likely to be simply a starting point. As we suggest throughout, your web pages, once constructed, have tremendous potential for growth. Such growth may be quantitative and/or qualitative, is likely to be fundamentally organic and may be as much student-led/inspired as anything else. Furthermore, technological advances mean more improvements are likely not just for materials but in terms of students engaged in working on such pages being able to see and hear each other as well as exchanging text messages and working on shared resources (Collis and Smith 1997). In this sense, though web pages may be designed to support a traditional model of university instruction, the web offers the chance of opening up the interaction of student and knowledge in exciting new ways (Duchastel 1997) and integrating skills teaching in a way which is not obviously forced.

Roberts (1999) suggests several interrelated factors in explaining the success of WBI; crucially these include the lecturer's willingness to change his or her methodology and the provision of well-structured learning experiences. However, given the number of variables involved in terms of learning possibilities and

outcomes, this book resists the tendency to say 'this is exactly how things should be done'. The book looks simply at possibilities; it does make some strong suggestions, based on experience, but its aim is not to satisfy your hunger by giving you the fish, to use the Chinese proverb recycled by the Commonwealth of Learning, but to teach you how to catch your own fish (Daniel 1999). As Open and Distance Learning materials are developed, there are likely to be an enormous number of variables at play; technology may make the idea of individual academics recede, to be replaced by teams and division of labour. Significantly, there are likely to be cultural differences in how it is thought best to incorporate new ways of teaching which will highlight skills, as much as knowledge and understanding. Faced by the possibility of huge globally provided courses, the provision of locally inspired web resources is perhaps a crucial counter-weight to homogenizing forces in education and society more generally. It should not be forgotten that a successful programme in one location is not necessarily universal and may be less successful elsewhere (Sherry 1996). Whatever the situation, the quality of the pages which fit into whichever scheme will be of paramount importance. Given such a scenario, those who have been 'ahead of the game' will be best placed to view how they fit most comfortably into any new working practices and feel empowered accordingly.

Setting the scene

In quite a short space of time, higher education moved from the 'chalk and talk' era to one in which lecture theatres were kitted out with all manner of audio-visual equipment, and now to an age when the presence of computer systems is having a big impact. According to Barker (1998b), this has happened as a result of the conjunction of five interrelated factors:

- Availability of cheap, easy to use electronic storage facilities.
- Availability of interactive information retrieval software.
- Facilitation of information sharing by global communication networks.
- Relatively easy assimilation of information through multimedia techniques.
- Easy individual/group communication by electronic means.

The web is an extraordinary 'free' source of information which has mushroomed in popularity from limited beginnings in US schools to a global network, presenting numerous challenges for other forms of information delivery (Flake 1996). It is to be hoped that teachers have more success than the French Minitel system in responding to these challenges and ensuring that technology works for and with them rather than against their interests. The convergence of computing technology and telecommunications allow the integration of graphics, text, moving images and communication on a single screen. Technology allows students to go well beyond prescribed texts and almost invites exploration and a pioneering/active approach to learning (Greene 1999) which a library seems, unfortunately, to inspire in all too few students.

In terms of internet-based resources there are a number of online directories to point you in the right direction (see Newton *et al.* 1998). As well as information, the web is a useful way into many IT skills. The insight that multimedia-based open and distance learning is especially suited to match the training needs of a modern information society led the European Union to start and fund the DELTA programme on the subject (Friedrich 1997) and there are many other examples of work in this area (see Khan 1997b). Although higher education is still predominantly associated with shared residence and printed media, some think

that open and distance learning, especially using the web, will become the dominant themes in higher education of the future (Nyiri 1997).

In recent years there has been a growing interest in producing course materials on the world wide web. The world market for technology-based learning which was already US\$6 thousand million in 1997 is estimated, conservatively, to reach US\$26 thousand million by 2005 (Canadian Telework Association 1998). A web-based ODL has several advantages. Material can be accessed from a distance, a wide range of media can be employed, conferencing can be undertaken and so on. Computer networks open up new possibilities for the support of synchronous and asynchronous learning/teaching activities (Barker 1998a; Berge 1999; Shotsberger 1997). With IT skills now regarded as key skills, such courses can provide an important and interesting way to introduce them into the university curriculum.

However, there are problems in setting up and using ODL packages, most notably in terms of time and skills on the part of the teacher or teaching team. There are additional problems with ready-made packages (Chen and Zhao 1997) and these are discussed in Chapter 1. This book draws on the experience of the authors who have successfully used web-based projects as integral parts of level three, two and one modules in the Department of International Studies at The Nottingham Trent University (as well as other smaller projects) in order to suggest what works and what does not. We do not deny that further research into pedagogical issues surrounding the web is highly desirable (Windschitl 1998); on the other hand, progress will undoubtedly be made through application rather than purely theoretical reasoning and proceeding on the basis of 'what works' will be a necessary

supplement to pedagogical/theoretical reflection.

This book addresses the issues related to the successful integration of specifically tailored, web-delivered material as an integral part of existing, traditionally taught modules. It also examines some of the practical issues surrounding WBI in the light of attempts to reconcile the costs of such innovation with the educational benefits (Ruppert 1998). An evaluation of this type of delivery as an enhancement of the undergraduate experience is discussed in terms of open and distance learning. Since this is, in essence, a practical guide, this introduction and Chapter 1 seek primarily to contextualize our efforts and come complete with a range of references for those who want to read around the history of such projects and the problems and potentials encountered by other projects.

The writing team come from a range of backgrounds. Jane McNeil teaches medieval history and has a long-term interest in the internet. David Graham teaches geography and, although possessing a long-term interest in information technology (IT), is a relative newcomer to the web. Lloyd Pettiford teaches international relations and is something of a novice in terms of IT and a neophyte to the web. We hope that this range of backgrounds, variety of subject areas and different approaches to using the web in our teaching will stimulate and encourage others with aspirations to use the web for teaching or make more use of the web in their teaching. We have each developed our own WBI, based on modules we teach at The Nottingham Trent University.

The original project was developed in 1996 as a supporting element to a social geography module taught to second year students. We wanted to use the media as a way of expanding the

horizons of the undergraduates but also to use the web as a means of broadening access through open and distance learning (ODL). By embedding and combining media within web pages the basic but effective *Social Geography and Nottingham* (Mark I) WBI was born, building on the material in the module but using local examples with which the students would have some familiarity. This proved to be a great success with the students. It was decided to expand and develop this into a Mark II version. This has been test driven and approved by a further cohort. It is now in its third incarnation and still going strong.

Such was the success of this project that we decided to expand the scope of web-based teaching. We were successful in bidding for internal funding which allowed us to purchase equipment and software and employ an extra pair of hands in the shape of a research assistant. Thus a new WBI dedicated to a third year environment in international relations module was developed and *e:net* was born. This had different aims from *Social Geography and Nottingham* and was targeted at a completely different audience. Once again, this proved to be a popular addition to an existing module.

The baby of the family is the *Medieval History* WBI which supports the first year medieval history module. This is a team-taught module and has been set up as a study aid. Early indications suggest that this site is popular with the class.

This book is based on our experiences of devising, designing, constructing, testing, adapting and evaluating three fully functional web-based teaching and learning products. These were all written from scratch and based on HTML. Although some WBI authoring software is available (Goldberg 1997; Hansen and Frick

1997), maximum flexibility is achieved by using the hypertext that is the backbone of the web.

The web can be used in a number of ways to enhance education and deliver material. A number of models have been developed for a variety of pedagogical purposes. These are:

1. Information-based models – the web is used for retrieving information, as in virtual museums and digital libraries.
2. Teaching, media-based models – the web is used only for dissemination of educational material to off-campus students in the form of module handbooks, booklists, software, and the like.
3. Enriched classroom models – ODL techniques are used via the web to complement traditional classroom-based teaching.
4. Virtual classroom models – the web is used with emphasis on collaboration and computer mediated interaction (Retalis *et al.* 1998: 16).

Our WBI projects cover some of these, especially models two and three.

How to use this book

Just as we stress throughout that WBI is a non-linear process, so your approach to this book should be on a need to know basis. Do not feel that you have to heed the advice the King gave to Alice. You will probably wish to read this introduction as a preliminary. However, though the chapters are written in sequence, there is no requirement to follow our ordering rigidly. Some users might feel confident with the material in some chapters and choose to skip these. This is simply the best order that we have found to work to.

It is definitely not designed as a manual. Many useful and not so useful books and articles are available about the internet, the web, web design, HTML and the like. Nor is this a book about ODL or using new technologies in teaching. Many good books and articles on open and distance learning exist and are referenced in this work. What this book offers is our combined experiences of constructing WBI from scratch.

Chapter 1 begins by considering the pedagogic logic of using the web as part of your teaching. It starts with conscious reflection on what your needs are. It is important not to visualize web pages as simple tack-ons to learning, but as fully integrated additions. Teaching has incorporated the internet in recent times in this way, but this is felt to be unsatisfactory for a number of reasons. Simply providing information in a substitutive fashion adds little to the learning experience. Thus the issue of integrating web-based projects is crucial. Also in Chapter 1, the issue of evolving and quantifying learning outcomes is addressed. This is an exciting time with much research into pedagogic issues and web-based packages taking place (Edwards 1996). Chapter 1 might be said to stem from and develop Barker's (1998a) 'four major ongoing transitions'. These can be summarized as, first, a move from instructivist learning and teaching philosophies towards ones based on principles of constructivism. Second, a shift away from tutor control. This means moving to a situation where students are responsible for specifying and managing their own learning activities. As flexibility in terms of career progression becomes increasingly salient to the graduate employee, these are skills which will be ever more valuable. Third, there is a move to a situation where learning materials are much more universally available. That is, they are not specific to a particular time and place but are available at any hour and from any location. Finally,

computers are increasingly being used in what Barker (1998a: 4) terms 'computer mediation'. By this he means the use of computers to back up, reinforce or extend knowledge transfer leading to the 'development of rich mental models'. Numerous individual case studies attest to the numerous benefits of using the web to facilitate active learning (Yaverbaum and Liebowitz 1998).

Moving to Chapter 2, the need for this book stems from one particularly important reason. Since the web is exciting and new, in a rush to use new technologies, many people have tended to overlook the design aspects of online hypertext (Barron *et al.* 1996; Falk 1997). In Chapter 2, issues of planning the information architecture are addressed – concerning content, functions, structure and thought paths. Architecture is the key notion. A house would not be considered very desirable or sensibly designed if all the rooms were ranged in a straight line with the only way from one to the next being a single connecting door. Similarly if all were kitchens! Much the same can be said of an interconnected set of learning resources; a linear approach may not be most suitable, though as with traditional teaching it may sometimes be necessary. Chapter 2 thus discusses a range of issues designed to ensure a desirable residence for your teaching materials, since the nicest of furniture can look out of place in inappropriate surroundings. Furthermore, you have to make people want to stay in your house. Though an advantage of WBI is the freedom students have to pursue their own thing, this can lead to a superficial approach. Your design needs to make people want to stay, and you, therefore, need to encourage students to do something with the knowledge they are presented with. Your information, however good it is, must be organized and sensibly arranged (housed) if it is to prove a useful learning resource (Schwier and Misanchuk 1996).

Chapter 3 takes the above analogy a stage further. Designing a successful house is not just a question of deciding which rooms go where but what the place looks like, how easy it is to live in and how to get around. Will your students be able to do this, even if they do not enter from your main page/orientation section? There are then certain practical, navigational, considerations; a house with too much state of the art technology might be difficult to understand or expensive; maybe even difficult to get around. Similarly, in designing web pages there are various technical constraints to be addressed and trade-offs between what is desirable and what is practical. The downfall of many individual/private web pages is an inability to sacrifice an all singing, all dancing approach for the benefit of those who might visit the site.

Having decided against linear arrangement of rooms and a jacuzzi in the kitchen, the next stop is furniture. What material will you use in your pages? Clearly this is related, to a large extent, to the particular subject you are teaching. However, there are important issues related to copyright (Douvains 1997), utilizing multimedia and assessment, which can affect content, and these are discussed in a general sense in Chapter 4. Part of the wasted time referred to by Ward and Newlands (1998: 174) above in talking about setting up web pages was due to 'uncertainty about the law of copyright relating to publishing in electronic format and how, if at all, it differs from established copyright law'. A considerable part of Chapter 4 is devoted to this vexing subject.

Chapter 5 then builds on these issues to discuss those inspirational finishing touches by providing practical examples/ideas of things to do with your web pages. We also explore ways that your WBI can be implemented into your overall teaching strategies. The topic of motivation is also discussed, in terms of your own motivation and that of the students.

Chapters 6, 7 and 8 discuss in detail various technical aspects in order that you can physically set up your web pages. In an ideal world, universities would be proactive in providing technical support for staff to set up web pages (Maddux *et al.* 1999: 43). The fact that most are not doing so means that discussion is provided here of software issues, web graphic formats, design considerations and hardware considerations such as scanning and digital cameras. Understanding and using HTML, the standard language of the world wide web, is particularly important and there is a chapter devoted to it and creating pages (see also Scigliano *et al.* 1996). Finally, in this group of chapters, Chapter 8 discusses ways of adding interactivity to your web pages through features such as forms (also quizzes – on which see Kerven *et al.* 1998), easy JavaScript and both synchronous and asynchronous web conferencing. Again, some aspects of these considerations find expression in individual short articles (see Reed and Afieh 1998; Cabell *et al.* 1997 on Java) but here we seek to integrate them into a more satisfying whole.

With your web pages carefully constructed and decorated you will be in a position to test them with students and adapt them accordingly. Chapter 9 deals with such issues, as well as implementation, evaluation and assessing learning outcomes. An advantage of web pages over other forms of learning resource is their capacity to evolve over time and with experience. Not only can a conservatory be added but, unlike with a house, whole rooms can be moved!

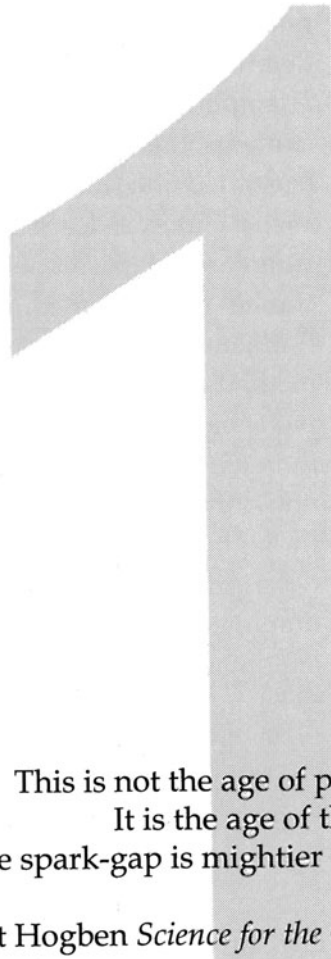
This book comes with a glossary of key terms and if you are interested in pedagogical rationales or technical specifications a full bibliography provides routes for further investigations of an area that will become increasingly important.

This book is not intended to be the last word in web design. Accordingly, not all possible angles are covered. Nonetheless, the experience of the authors suggests that careful planning is required. Knocking together a few relevant web sites with no clear idea of how these fit together or how they enhance the student's learning experience is not only unsatisfying but very probably a waste of time.

We hope that readers will be able to use this book to tap into our experiences. We come from different backgrounds and have produced a range of products, based on different academic disciplines and aimed at students at different levels of their university education. We hope that this shows that the material that follows will give hope and inspiration to teachers from all sectors and from all disciplines, regardless of the level of their technical expertise. With time, practice, patience, dedication and perseverance you too can make your own fulfilling, exciting and much appreciated WBI.

chapter one

why use the web for learning and teaching?



This is not the age of pamphleteers.
It is the age of the engineers.
The spark-gap is mightier than the pen.

Lancelot Hogben *Science for the Citizen* (1938)

Many people are quite unsure about how they feel about the integration of technology into pedagogies largely unchanged for centuries in university and other teaching arenas, fearing, for instance, that 'when using these environments pupils may not be well prepared in the wider skills that other...more traditional, teaching techniques and practices can provide' (Coleman 1999). In the case of open and distance learning (ODL) technologies this is true of both teachers and students. McConigle and Eggers (1998) suggest that instructors may feel (consecutively) excited, apprehensive, questioning, determined, over-stimulated, questioning again and exhausted in attempting to integrate newer technologies into their teaching. For students, the 'stages' are described as confused, shocked, timid, frustrated and 'Eureka'; it is worrying that students might arrive at such a climax as teachers find themselves simply exhausted! To summarize, it might be said that for all who encounter ODL the combination is sometimes one of both fear *and* excitement (Williams 1999). Whatever the fears, traditional or accepted methods should not be held sacrosanct; we are talking about pedagogies which some, though perhaps rather harshly, might intimate involve a process whereby knowledge is passed from the notes of the lecturer to the notes of the student without passing through the minds of either. Less harshly, or at least more descriptively, we might say that the traditional lecturer tries to dominate and gain the full attention of the students (and can be legitimately irritated if this is not offered). The lecturer is, or tries to be, in total control of the learning experience and the students are obliged to be passive recipients of information and ideas (and may be legitimately bored if this does not interest them!). Even without deifying technology, there is every reason to suppose that such a situation can be improved upon and, though it can be addressed *within* traditional methods, this is the real possibility for ODL on the web and for excitement rather than fear.