Approaches to network training with particular reference to a perceived need for self-help materials

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Abstract

The Network Training Materials Project at the University of Newcastle (UK) surveyed the existing scope of network training materials and found that printed material was the most common, but that there was a demand for alternative forms of training material, particularly for self-teaching purposes. The Project is producing generic training materials primarily for the UK user-support community., though in practice, they have been taken up world-wide. These materials, and the community's response to them, is described. The paper briefly surveys examples of interactive and self-help training, looks at issues pertaining to self-teaching, and puts forward a proposal for self-help, interactive training.

I. Introduction

As Internet fever sweeps the world, thousands of new users are coming on-stream wanting networking skills and needing to know about the information resources on the networks. In the academic and research community, user-support staff are beginning to attend more closely to an activity which, in the past, they may have seen as specialised or peripheral, namely the task of training users to use the networks, or *network training*, as it will be referred to here. This is an area of fast-growing demand and increasing significance, and it is timely to take a broad look at the ways in which it might be approached.

In this talk, I will be looking at a number of approaches which have been employed in network training, and will recount the experience of the UK's Network Training Materials Project in developing generic network training materials for use and adaptation by trainers in the UK and elsewhere. I will look at what has so far emerged from the experience of the Project, and spell out some proposals for the future.

II. Scope and style of network training materials

The Network Training Materials Project initially surveyed available training materials to identify gaps in provision and to identify models of useful material. This survey[1] gives an indication of the scope of formats employed in existing network training. Printed booklets accounted for many of the titles in the *List*, these often handed out in conjunction with a course or alternatively, intended to serve as a substitute for a live training session. They might intersperse instruction with step-by-step working through example network sessions. There was very little that was not intended for consumption in printed form, and only a few notable items which could be classed as computer-based material. A number of these employed hypertext as the vehicle of interactivity. Since the survey was completed, the delivery of network training via the network has become more noticeable, with WWW emerging as a tool of great potential in this sphere. A number of courses delivered via email have also been carried out.

But ironically, the greatest growth appears to have been in printed material. As the prospect of more widespread and intensive use of networks and their electronic information develops, we have seen a spate of publishing of books and magazines about the Internet. The nature and sales of these publications are reminders that networks are no longer the domain of the academic and research communities but that their use is percolating through the community at large, especially in the U.S. As Internet usage escalates, more of these printed guides are being addressed to private and commercial users. Such users may seldom have access to training and support provided by institutions, so the market for printed guides as well as commercially provided training is likely to expand.

III. Materials developed by the Network Training Materials Project

The brief of the Network Training Materials Project was to develop a set of generic training materials to support and promote network training in UK higher education. In developing these materials, the Project sought to involve the UK user-support community in the process by seeking input on what was needed, through the mailing list *itti-networks@mailbase.ac.uk*, and through several discussion workshops. A number of sites volunteered to pilot the materials, and feedback from this process considerably helped in the production process. The involvement of the community in these ways made not only for more useful products, but helped to counteract the *not invented here* syndrome. Similarly, making it easy for trainers to take the materials and change, adapt and mix them to suit their own purposes made it possible for them to come up with something which was, at least in part, their own artefact.

III.A. Generic materials

The fact that users came to network training with a vast range of skills, interests and requirements is a serious consideration within a single site, let alone in the context of developing training materials for general use. If effective training courses need to be centred on the learner, then training materials for general use risk being ineffective unless they have the environment-specific enhancements which individual trainers can provide. Trainers need to invest some time in adapting the materials to their local needs. But if they have a good idea of what their users require, they will have the advantage of a readily available body of generic training materials on which to build.

The approach taken by the Project has been to produce a 'mix and match' pool of materials, collectively known as the Network Training Pack. The materials are intended to cater to a variety of training needs and situations, viz. stand-up training, hands-on workshops, self-paced learning, skills-based learning, resource-based learning, and raising awareness and motivation for using networked services. The diversity of the materials is about providing for a range of possibilities, and in this way enabling trainers to slot selected materials or parts of them into the training courses they design. Vital to this process is a clear statement of the purpose and level of the various modules in the Network Training Pack. Each module may consist of several different components designed to cover different aspects of training. For instance, the first unit of the Network Training Pack is designed to provide an introductory overview of networking to the computer-literate beginner to networking. It consists of a presentation, notes on online demonstrations, workshop exercises, and a handout. Through this mix, it caters for a variety of training styles and attempts an all-round approach to the subject for the network novice.

III.B. Form

The form of the materials has implications both for their deliverability and their adaptability. Portability and flexibility of format have been high priorities for materials coming out of the Project, though inevitably, some compromises have had to be made in the interests of sensible investment in production. The first crucial decision was to make materials available primarily in electronic form, and then to ensure that they were usable across a range of computing environments. Platforms and formats catered for were selected on the basis of maximum usability for minimum outlay, and the end-result was an undertaking to use dual-platform (PC and Apple Mac) software in producing the training materials, and to offer word-processed documents in Word, RTF (Rich Text Format - Interchange Format), and plain text. The aim was to ensure that all the Project's material could be either taken as is and used, or that it could be changed or adapted as required by trainers.

III.C. Content

The range of computing platforms used in the academic community could be seen as a difficulty in writing training materials for general use. The Project has tackled this problem by confining content to the general, wherever possible, or prompting trainers to fill in specific details which relate to their local computing conditions. The inclusion of system-specific commands is avoided, except where occurring in examples shown. The materials deal with the functionality, applications and other general aspects of network facilities and services. Trainers are left to flesh out the generic material with such practical detail as the local user will need.

III.D. How has the material been received?

The files which constitute the Network Training Pack have had enormous uptake in terms of file retrievals. They have been made accessible in an ftp archive on the host *ftp.ncl.ac.uk* and also via the Network Training Materials Gopher (*trainmat.ncl.ac.uk*). At April 16th, the total retrievals were:

Retrievals of Network Training Pack files	
Via anonymous ftp	9022
Via NTM Gopher	10789
TOTAL:	19811

The pattern of retrievals from the UK reflects a steadily growing awareness of the Training Pack, and in addition, there has been extensive uptake of the materials from outside the UK. The informal feedback from the network training community has generally been very positive. Where people had difficulties, it was usually related to the usability of the formats in which the material was supplied. While the Project has sought to satisfy the greatest bulk of people whose computing facilities lie in the middle range, the people at the low end and at the high end are less well catered for. For instance, the presentation files will not look their best on a PC 286, nor can you look at them readily on a Sun workstation. The network training community has nevertheless provided valuable input to the development of the materials, and many suggested improvements were incorporated as the materials were developed.

In September 1993, when the first unit of the Network Training Pack had been available for some months and the second was in draft form, the Project held a workshop for trainers and invited them to have their say on the future plans for production of training materials. Four options were presented to them as possible items for production after the initial three units were complete. The options were:

1) a printed version of the Training Pack
2) a video based on the presentations
3) an interactive package for self-paced learning
4) a printed guide to networking

The workshop voted by a healthy majority for the interactive package as a first priority; next in popularity was the video. The two printed items lagged well behind the first two. The general theme of the discussion was that, given the demands on them, what trainers most needed was effective self-teaching material for users. This conclusion has been reinforced by subsequent communications with trainers.

IV. Self-help network training

IV.A. The context of UK demand

In the UK, self-teaching materials appear to present a solution to a supply/demand problem. Trainers feel unable to provide training in the face of escalating demand, this generated by several factors:

- The need to realise the benefits of a large investment in network development

  The Joint Information Systems Committee, the central funding authority for computing in higher education, supports a number of national networked services, as well as the maintenance and upgrading of the networking infrastructure. At present the JANET network is undergoing a significant bandwidth improvement, and the resulting network, entitled SuperJANET, is already partly in place. The higher education community needs the skills to avail itself of the advantages offered by this investment.

- Training is needed on a number of levels in the academic sector

  The spectrum of need is wide as well as deep. There is a great mass of people largely ignorant of the skills for using the network; in lesser numbers, there are researchers wanting to publish information on the network and needing the requisite skills, e.g. to set up a WWW server and format documents appropriately. There is also an increasing expectation that the student body as well as academic staff should become competent network users, which means massive numbers becoming eligible for training.

- Networked resources are becoming more important

  More resources which researchers and teachers rely on are becoming networked. The purchase of datasets on behalf of the whole higher education community and their delivery via the network is an example of this trend, e.g. the ISI (Institute for Scientific Information) databases, EMBASE, the Times. The potential for using networked resources for teaching and research is increasing rapidly.

- There is generally a shortage of staff resources to train new users in acquiring network skills

  Staff resources in Computing Centres are being cut back or distributed around the campus just as the need for massive network training programs is becoming apparent. At present, not all sites provide network training other than training in the use of the locally supported email package. Generally staff feel that they are fully committed already, and often see network training as an optional extra rather than an essential. An alleviating factor is that librarians are entering the field of network training, bringing a more information-oriented approach to the task.

In summary, however, there is an enormous requirement for basic network training, an accelerating need for more sophisticated user support, and an inadequate supply of staff resources to meet the needs. In this economic context, self-help training may look like the perfect solution, but how practical is it in reality?

IV.B. Advantages

The obvious advantage to the individual trainer is that it may not necessarily involve any of the their time; either in actual training, in planning a training event, or in setting up facilities for delivery of the training. And where the materials development is centralised on behalf of the whole community, there are economies of scale. Trainers need not be involved in production, and investment in development may be full realised.

It can be very flexible, not least in its method of delivery, e.g. paper, computer-based interactive, online interactive, video, etc.. In content, it can offer great flexibility for the learner when it incorporates options appropriate to different levels of expertise and areas of interest. Well-designed material enables the trainee to plot their own path through the training, providing feedback as they proceed, and enabling them to set their own pace.

IV.C. Disadvantages

There are, however, some significant disadvantages to self-help methods. The greatest is probably that it is expensive to produce. Preparing material is highly resource-intensive. It requires time and skill, and may require significant investment in computer hardware and software. Well-designed materials may call on, not just a knowledge of the subject matter, but good communication skills - visual as well as verbal, an understanding of design principles including screen design, and an understanding of how people learn.

From the point of view of the user, solitary self-teaching may fail because it does not motivate for very long. There may not be a goal to strive towards, so the learner does not persist, particularly if the learning material is at all dull or presents difficulties. It is more difficult to maintain the momentum of the learning process, when there is no extra stimulus such as might be provided by a trainer and co-learners within a formal training session.

V. Forms of self-help training

People teach themselves about networking in a variety of ways. Mostly they read a document printed on paper, but a number of other options are available. Let's cast a brief look over some of the possibilities:

V.A. Printed material

Since such classic titles as *Zen and the Art of the Internet*, we have seen a marked increase in the output of printed guides (or documents intended for consumption in printed form). Previously, the bulk of titles were freely available in electronic form from anonymous ftp archives and were generally written for the academic or research user. Much of the newer material, however, is conventionally published and is oriented towards the private or commercial dial-up user wanting to learn how to use the network.

V.B. Interactive packages

A number of the interactive packages on networking are based on hypertext. Hypertext provides a means of moving effortlessly from a specific point within a document to related information in another document.

The NNSC/BBN *Tour of the Internet*, for instance, provides an introduction to the Internet and its services using Apple's Hypercard. As well as hypertext, it employs the technique of step-by-step building of sample network sessions. This is now several years old, but provides a good example of the offline hypertext approach.

For the PC world, some examples of hypertext packages are *InfoPop/Windows*, a Windows Help file on the Internet, and *HWGUIDE*, a hypertext version of Noonan's *Guide to Internet/Bitnet*, produced with Hyperwriter.

Merit's *Cruise of the Internet* provides possibly the most sophisticated interface of any of the interactive packages on networking. It was designed to complement an introductory presentation on networking and provides animated sequences, interactive buttons, pull-down and pop-up menus, etc. The package was produced with MacroMind Director and is available for Apple Mac and PC. Possibly, it could be used as a self-teaching tool, to give a flavour of networking.

V.C. Video

These have generally been used for awareness-raising, possibly complementing course material. For instance, the video *Beyond the Walls* explained (Bitnet-based) network services from the point of view of an English literature academic, following through her workday and showing the ways in which she used the network to support her research and teaching. Similarly promotional, the NASA video *Global Quest* presents an exciting view of the potential for use of the Internet in the classroom.

V.D. Training 'over the network'

Recently, we have seen a number of courses and training services offered via the network itself, and it seems likely that this trend will continue and develop.

V.D.1. Email courses

In November and December 1992, a course entitled *Navigating the Internet*, was offered via email. It was taken up by 15,000 people from 50 countries. It consisted of lessons on using different network facilities delivered via a special purpose mailing list. The course was considered so successful that a further course, entitled *Let's Go Gopherin'* was offered in 1993.

E-mail offers some obvious advantages for the delivery of training, such as easy distribution, and in this case, the very aptness of the medium to the topic. However, it's essential feature of non-interactivity may have disadvantages for training. The evidence suggests that where no time limit is attached to dealing with training material received via email, the tendency is to postpone using it, and possibly to fail altogether to use it.

Since 1991, the Norwegian project, FIK (Distance Education through Communication Services), has offered distance education courses for educating network users[2]. Students on the course use network services for interaction, education, and as part of the curriculum. It was found that the students continued to use the network in their daily work after the course was finished.

V.D.2 Interactive training servers

Recently, WorldWideWeb and gopher have both been used as a medium for training. John December's WWW network training server, *Internet Web Text* [3], is a hypertext guide to Internet resources, providing online links to resources referred to in the text. It was originally set up as a means for students in December's CMC (Computer Mediated Communication) theory course to explore the Internet.

Another WWW example is the *GNA (Globewide Network Academy) Internet Course*[4] which uses WWW for distribution of class notes and MOO for interactive consultancy. The class consists of a hypertextbook, and a consultants room where users can ask questions about the Internet in real time.

The *Network Training Materials Gopher*[5] though originally designed as a repository and pointer to materials, is emerging as a *one stop shop* for information finding about the network and for links to services illustrating the network. The last set of exercises in the Network Training Pack made extensive use of it as a launching pad to services and as a tool for searching. It is likely that the facility for tailoring of menus to workshop or other live training can be much more fully exploited, so that this gopher may evolve from being a repository for training materials, to a tool for active training.

Another gopher-based on-line training service is *CNS Internet On-Line Training* which can be viewed on the Network Training Materials Gopher. The service provides training documentation about various Internet services, including questions to test knowledge.

VI. Addressing training needs

It seems apparent that the *Holy Grail* of network training at present is something which provides a seamless interface between self-teaching and live network sessions. To some extent, this has been done with WWW, but the problem is that once the learner is thrown out onto the network in a live network session, how do they get help if they encounter difficulties? Another reservation is that users of hypermedia systems such as WWW can easily get lost in hyperspace. However, despite these reservations, WWW appears to offer promising possibilities as a basis of self-help network training. As an online service, it uses the network to teach about the network, but could also be packaged on disk to give an offline limited simulation of a live network service. In either context, the basic package could be enhanced with material catering to specific requirements, such as subject interest, by providing links to additional files on the local machine.

VI.A. Proposal

A proposed solution to the UK's network training requirements is to provide facilities for nationally centralised mass network training for the academic sector, and to make the provision of self-help network training an important focal point of the facility. The nationally funded Network Training Materials Project is uniquely placed to provide such training. It already provides a central repository of network training materials via a server, and this facility could be extended and developed to offer not only training materials but also training. The Project is seeking funding to extend the scope of its operations, and if it is successful, it will be looking to the delivery of network training interactively over the network via a 'Network Training Server'.

VI.B. Network Training Server

This server, building on what has already been achieved with the Network Training Materials Gopher, would provide a corpus of training documents and facilities accessible by a variety of means, such as WWW, gopher, or other tool. It would offer:

1) an online repository of up-to-date network training materials for the benefit of trainers seeking to survey, browse, retrieve, and ultimately use the training materials for their own training purposes. The aim of this repository would be to promote and facilitate network training by meeting the needs of *trainers*, both for training materials and also for

supporting material, such as sample files, software, etc.

2) a means for trainers to make available their own locally developed materials. In providing a convenient vehicle for pooling material, the server might encourage the sharing of material and promote economies in materials production for the community at large.

3) self-teaching material, in which training is delivered interactively, with the option of live network sessions incorporated into structured learning modules, and catering for different levels of expertise and interest. Using the multi-media capabilities of the evolving high-speed networks, moving image, voice, and animated graphics could be utilised in training presentations accessed via the server in real time. By providing an easy means for learners to learn by doing, it provides the ideal medium for interactive self-help network training.

4) a tool for trainer support

- as a training aid/foundation for training workshops
- as supplementary training - pre- or post-workshop
-an interface to services supplementing the interactive learning provided on the server, e.g. e-mail discussion list or computer conference
- a feedback mechanism for trainees on the training provided

Conclusion

In summary, there is currently a growing need for network training, and in particular, an expressed need for self-help interactive training, ideally incorporating the option of live network sessions within training modules. A centrally maintained Network Training Server using WWW offers exciting possibilities for effective and flexible training, economically produced, maintained and delivered. It holds the promise of being a unique facility for centralised network training.

References

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