NO BRICKS IN THE WALL – DELIVERING CONTINUING PROFESSIONAL DEVELOPMENT THROUGH WEB TECHNOLOGY

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Abstract

The evolution of Web technology is enabling professional development opportunities to be delivered to a wider audience. Individuals are now able to extend their networking beyond the walls of the organisation in which they work, seeking out and understanding new ideas and opinions. Web technology is facilitating the delivery of continuing professional development to a wide range of professional communities. Individuals are now able to pursue their desired professional developmental goals in a more flexible, efficient and innovative manner than was previously possible.

This study examines how continuing professional development can be delivered to a wider audience through Web technology. The key issues surrounding the construction of a successful Web community are examined, along with the tools required to construct a thriving Web community. This study will also examine the application of these issues within the context of a Web community of Scottish computing teachers.
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Chapter 1: Introduction

1.1 Background

The evolution of Web technology is opening professional development opportunities to a wider audience than was previously possible. Professional development is now becoming more accessible to those who need it, when they need it.

Web technology can be used to develop online communities with the specific aim of delivering continuing professional development to the wider community. In doing this, continuing professional development can be substantially enhanced by opportunities to collaborate with others within the Web community.

Through building professional communities, individuals are able to extend their networking beyond the walls of the organisation in which they work, seeking out and understanding new ideas and opinions. Web technology is facilitating the support of a range of professional communities, especially under circumstances where community members are more geographically dispersed.

Web technology can be used to complement existing forms of development and learning, delivering continuing professional development to a widely diverse and dispersed audience. Web technology is enabling individuals to pursue their desired professional goals in a more flexible, efficient and innovative manner than was previously possible.

1.2 Aims and Objectives

The overall aim of this dissertation is to analyse how continuing professional development can be facilitated using Web communities. Briefly, the objectives of the research are as follows:

1. Investigate how continuing professional development can be delivered to a wider audience via Web communities.
2. Identify the key issues surrounding the construction of a successful Web community.
3. Identify the tools required to contribute to the construction of a thriving Web community.

1.3 Chapter Outlines

Chapter 2 Continuing Professional Development: A review of the literature regarding continuing professional development, in light of theories, surveys and studies examined by academics.

Chapter 3 Web Communities: A review of literature regarding the key factors in building a successful and thriving Web community, in light of theories, surveys and studies examined by academics.

Chapter 4 Methodology: Details of the proposed methodology of this dissertation, including an explanation of research methods and their appropriateness for meeting the aims of this study.

Chapter 5 Community of Scottish Computing Teachers: Presentation of the discussion, findings and analysis of the case study. This will involve examining the Web community of Scottish computing teachers.

Chapter 6 Conclusions: A presentation of the conclusions, along with recommended areas for further research.
Chapter 2: Continuing Professional Development

“To know that we know what we know and that we do not know what we do not know, that is true knowledge.” - Confucius.

2.1 Introduction

This chapter will examine the key issues surrounding continuing professional development. The drivers of professional development will be discussed before examining how professional development is being approached within a sample of major corporations. The factors concerning approaching professional development using Web technology will be considered before discussing the various costs attached to implementing the necessary Web technology.

2.2 Traditional approaches to Professional Development

Traditionally, professional groups develop using means such as conferences, meetings, newsletters and courses. No matter how excellent a professional development opportunity may prove to be, it is of little value if it is not accessible to those who need it most, when they need it, or is available to such small numbers of people that the impact is minimal. The Web cannot provide all the things that come with more 'traditional' approaches, and individuals can often feel more at ease operating in a face-to-face environment. However, Web technology can provide a great deal of flexible support to professional communities, especially under circumstances where the community members are more geographically dispersed, thus opening professional development opportunities to a wider audience.

Web technology and computer mediated conferencing (CMC) enable individuals to pursue their desired professional developmental goals in a more efficient, flexible and innovative manner than would be possible using more 'traditional' means. The use of CMC has the potential to create a multiplier effect, with a wider range of people benefiting at a higher level. "CMC enables the sharing and assimilation of a wide range of experiences of practice" (Salmon, 2000, p39).
2.3 Drivers of Professional Development

In order to be truly effective, people must take ownership of their professional development. Professionals must be willing to expand their knowledge base since "knowledge is the basis for permission to practice and for decisions that are made with respect to the unique needs of clients" (Darling-Hammond, 1998). Professional development is a continuing journey that must be undertaken by individuals within the context of their own unique needs and circumstances. A paradox is developing - networking is becoming increasingly global, yet the requirement of individuals from the potential of wide networking is very individual and focussed (Salmon, 2000).

Professional development may also be provided by professional organisations. For example, the Institute for Learning and Teaching in Higher Education (ILT) is the professional body for all those who teach and support learning in higher education in the UK. It exists to enhance the status of teaching, improve the experience of learning and support innovation. ILT also develops and maintains professional standards of practice and is becoming a main source of professional recognition for staff engaged in teaching and the support of learning.

In circumstances where support is provided by a professional organisation, there is a wider community with greater scope to develop different skills. Groups that approach professional development via online communities are able to go well beyond what is possible in specific training events (Selinger and Pearson, 1999; Leach and Moon, 1999). Through building professional communities, individuals are able to extend their networking beyond the boundaries of the organisation in which they work, seeking out and understanding new ideas and opinions.

Many employees seek a chance to make a real impact within their working environment. A 1998 joint survey by CIO Communications Inc. and Icex Inc. found that companies with systemic approaches to development have a lower turnover of staff (Arnold and Smith, 1998). Any developmental programmes must quench the thirst for knowledge within the community.
2.4 Barriers to Professional Development

It can often prove difficult to get people to 'buy in' to continuing professional development. Individuals often need to be reminded that they have a career - not just a job (Arnold and Smith, 1998). A common problem is that people are often more at ease with being told what to do, rather than taking ownership of their own career development and progression.

Approaches to overcoming these initial barriers include offering carrots or a 'badge'/qualification which may aid promotion and career progression. Professional development may be driven by employers who lay down stricter guidelines on how individual employees are expected to develop. Also, performance and the degree of professional development often have an impact on salary reviews etc. However, in order to be truly effective, individuals need to take ownership of their personal development.

2.5 Professional Development within Corporations

Training and professional development forms an integral part of many large companies' strategies for outpacing their competitors and luring and retaining the best employees. Need and availability are driving the demand for continuing professional development. There is a requirement to train a greater number of people on a wider range of topics, to do it cheaper, faster and on a worldwide basis. Individuals are now able to participate in developmental programmes anytime, anywhere and to learn at their own pace, paying more attention to areas of particular interest (Hall, 1997). Through allowing individuals to take ownership of their professional development, there are major benefits for companies. The business value in continuous professional development lies in retaining highly skilled staff and raising their performance levels (Arnold and Smith, 1998).

Traditional in-house training schemes tend to be fragmented and lack any kind of company-wide strategy or co-ordination. It is not uncommon to see a company offer half a dozen courses on one general topic for a range of in-house audiences and nothing at all in other subject areas. Conversely, corporate universities co-ordinate all training and education, creating a cohesive, centralised strategy aimed at filling training gaps and
eliminating or duplicating irrelevant classes, allowing individuals to take ownership of their own professional development (Meister, 1998). Regy Loknes, Senior Learning and Development Advisor for Shell, believes that employees should "know how they learn, know what they need to learn and be open and receptive to learning from others without negative responses and criticisms" (Salmon, 2000, p.91).

Many companies including Conoco, Siemens, Motorola and Microsoft are co-ordinating training and education via corporate universities (Stuart, 1999). These in-house corporate universities co-ordinate management seminars and workshops, offering a progressive curriculum aimed at providing employees with the necessary skills to improve performance in their current job and aid career progression. For example, Cox Communications Inc., an Atlanta-base media and Internet services company, match certain courses with certain jobs, allowing ambitious employees to develop their skills and facilitate career progression (Stuart, 1999).

Corporations are now realising the value of using Web technology to aid professional development (Schreiber and Berge, 1998). According to Corporate University Xchange Inc (1999), a New York City-based consulting and educational research group, more than 1,600 companies, including half of the Fortune 500 maintain corporate universities. 90% of those companies operating corporate universities use Web technology within their training programmes. Some of the courses are self-paced; while other may be offered real-time via videoconferencing, live chat or other technologies. Corporate University Xchange (1999) also found that many executives at companies with corporate universities thought that there were multiple benefits, to both staff and the corporation, of having a corporate university (see Figure 2.1).
The majority of end users know how to use a browser and this has benefited companies in the form of substantial cost savings since employees do not need any further instruction or new software to participate in Web-based classes. There have also been substantial savings with people no longer having to travel to training courses (Bacsich and Ash, 1999). For example, Siemens saved $1 million on training related travel during 1997 (Hall, 1997).

Arnold and Smith (1998) examined the approach to continuing professional development taken by the Federal Reserve Bank of St. Louis. They found that the bank has committed itself to a programme of continuous learning and growth by its IT workforce. This environment of continuous learning and growth has also benefited the bank in several ways. There has been a considerable increase in client projects involving IT professionals being delivered on time and within budget, customer satisfaction has increased by more
than 10 percent, staff turnover has reduced by 4 percent, and there have been significant cost savings in desktop learning technology.

The Federal Reserve Bank of St. Louis has developed three anchor phrases to summarise its approach to continuous professional development:

1. **Learning to build a better future**: Learning is driven by each individual's desire to grow and develop.

2. **Learning what you need to know anytime, anywhere**: Learning is driven by demand (rather than by a pre-determined schedule) and is available whenever and wherever it is required.

3. **Learning beyond the walls of IT**: A recognition that all bank employees do IT work of some description and that continuous development is neither restricted to IT staff nor to the classroom.

A major factor in the success of the approach taken by the Federal Reserve Bank of St. Louis lies in human choice. Through emphasising the importance of the individual's choice in their own developmental programme, the bank was able to give people real control over their future career path. The employees now play an active role in their own development rather than following training programmes in a set order.

The Federal Reserve Bank of St. Louis implemented several tools to aid staff development. The bank incorporated a Continuous Learning Network (CLN), enabling staff to learn at their desktop, in a learning network or at home. CLN software enables staff to learn at their own pace and is available anytime and anywhere. The CLN includes an intranet site that is the central resource for the following areas:

- Learning and growth information
- Events
- Hotlinks to learning sites
- Individual assessment tools
- A project manager toolbox
• Learning assistance checklists for managers
• A library of self-study courses
• Audio tape business books

As with any circumstance where there is now a choice where none existed previously, problems can arise. It is easier to be other-directed than self-directed (Arnold and Smith, 1998). Due to the fact that the Federal Reserve Bank of St. Louis’ employees were used to having no choice in their development, a Learning and Development Services team was introduced to support employees and help them set new career and developmental goals.

2.6 Aiding Professional Development Via Web Technology

Web technology provides a vital tool in aiding professional development. The technologies that are chosen to implement the online community will affect the options available to the users. It is vital that the chosen technologies are appropriate since different Web technologies are suited to various needs and requirements. It is not sufficient to merely have the tools for community building. A community is not instantaneously launched when a chat room is launched; just as purchasing a piece of land does not automatically result in a beautiful garden (Kim, 1998). Whatever tools are used, they must match the requirements and needs of the community and of the users. The greater the relevance of the tools, the more likely they are to be used more often.

Web technology can be used to complement existing forms of learning and development, delivering continuing professional development to a widely diverse and dispersed audience. Individuals may get less benefit from face-to-face conferences as conference size increases. Technology can mitigate these effects by providing a more 'personal' approach to professional development, offering a developmental programme that can be tailored to individual requirements. "Every learner can, at his or her own choice of time and place, access a world of multimedia material... immediately the learner is unlocked from the shackles of fixed and rigid schedules, from physical limitations... and is released into an information world which reacts to his or her own pace of learning." (Benjamin, 1994, p49)
Although the use of Web technology means that individuals can work at their own pace, there still needs to be a forum for getting feedback on their progress. There are also some subjects, requiring more nuance or hands-on involvement, that may prove more difficult to translate to an online environment (Stuart, 1999).

Professional development can be substantially enhanced by opportunities to collaborate with others within Web communities (Hixson and Tinzmann, 1990). The opportunity to take advantage of the expertise of others can provide community members with important reinforcement and incentive for continuing growth and development, along with enhanced personal status and respect that comes from membership in a community of learners with their professional colleagues.

The asynchronous nature of much of the communication that takes place online lends itself to continuing professional development and supports synthesis of knowledge (Salmon, 2000). Individuals have 24-hour access to the system and can log on whenever they wish and for however long they wish. Users are able to reflect on issues raised online, and their own ideas and thoughts can germinate through composing replies. The experience of one Open University teacher highlights the power of online communication: "I was struck by how I'm still in touch with the conference even when away from my computer and busy with other activities. Somewhere in my consciousness I continue to debate and new lines of argument keep occurring to mind unbidden. And it is always so tempting to take just one more peep at the screen to see if another participant has come up with something new or built upon the last message one posted oneself" (Rowntree, 1995, p209).

Continuing professional development is an ongoing process and as such, the use of Web technology to aid this process is not a one-shot event. Traditionally, individuals within an organisation would take one or two weeks off from their daily grind to go on a training course. The use of Web technology enables professional development to be a constant continuing process. However, technology is no panacea for professional development. In order to be truly effective, the use of technology must be linked to the objectives and goals of any professional development programme, and must deliver real value to the community.


2.7 Costs of Web Technology

There are significant costs attached to approaching professional development in an online environment. Technology is advancing at a rapid pace and there are various opinions about how to estimate costs and gauge what represents value for money. There is no standard way of measuring educational or other benefits of using Web technology for continuing professional development (Bakia, 2000). For example, accountants will look at the 'bottom line', while economists are more likely to focus on issues such as opportunity costs.

There is substantial initial expense involved in course development and setting up the infrastructure. There is also a substantial investment in expertise with approximately 100 hours of development required for every hour of instructional time in courses that are 'taught' real-time over the Web (Stuart, 1999). There is obviously less effort put into asynchronous classes.

Brown (1998) and Hawkridge (1998) have expressed concerns over the cost of using online applications as learning tools, believing that traditional courses are still more worthwhile. There are also doubts over how well people learn without human interaction and whether there is a difference between the amount of information retained in an online environment compared to in person. For example, individuals may not get immediate answers to questions that they have.

More effective use of technology as a learning aid and tool can undoubtedly enhance the learning experience (Salmon, 2000). However, innovation and collaboration are also costly in terms of both resources and time, with extra training and support required for individuals (Basich and Ash, 1999). As outlined by Rumble (1999), the cost of online learning depends heavily upon the context.

However, communities that focus too much on money issues and the costs of operating the community are in danger of losing sight of the true goals of the community (Schuler, 1996b). Cost concerns are often important, especially within communities with funding
difficulties. However focusing too much on cost issues can be detrimental and cause communities to lose sight of the true aim - that of preserving and helping the community prosper. Focussing on short term cost issues can blind the developers from building a sustainable long-term community model.

2.8 Summary

Web technology is increasingly being used to support professional development in a more efficient, flexible and innovative manner than would be possible using more traditional means. Several companies have recognised the business value in providing employees with the necessary skills to improve job performance and aid career progression. However, in order to be truly effective, professionals must be willing to expand their knowledge base and any professional development programme should be undertaken within the context of their individual needs and circumstances.

In many ways, Web communities are ideally suited to delivering continuing professional development. Through building professional communities, individuals are able to extend their networking beyond the boundaries of the organisation in which they work, seeking out and understanding new ideas and opinions from fellow community members. The key issues surrounding the construction of a successful and thriving Web community will be addressed in Chapter 3.
Chapter 3: Web Communities

3.1 Introduction

This chapter will address the key issues surrounding the construction of a successful and thriving Web community. The various tools for building a Web community will be examined before considering how the community can be supported and maintained. Finally, some useful measures for gauging the success of an online community will be examined.

3.2 The Concept of Community

Communities are widespread throughout human society and are found all around the globe. Communities come in many different shapes and sizes, and serve many different purposes. As outlined by Morris and Hess (1975), we all live someplace - we are all members of communities.

Communities have boundaries but these boundaries are fluid in many ways. For example, Glasgow may be considered to be a community. In turn, Glasgow is composed of many areas or neighbourhoods, each of which can be thought of as an individual community in its own right. Similarly, Glasgow is part of larger regional, national and global communities. Glasgow is a city in the west of Scotland. Scotland is part of the United Kingdom, which, in turn, is a member of the European Community, and so on.

As well as location-based communities, people can be members of political, ethnic, religious or professional communities, participating in more than one community at a time. The world does not neatly divide along any lines that are drawn. The membership of communities is fluid as people move in and out of communities. People can be members of many communities and serve a wide variety of roles within these different communities.
Schuler (1996a) outlined three uses of the word 'community': (1) A group of people who live together in the same geographical locale. (2) A group of like-minded people. (3) A state of togetherness, group communion and mutual concern.

There is a sense of community where members have a sense of belonging to a greater social unity. In addition to the concepts outlined by Douglas Schuler, the use of the Internet to develop Web communities has meant that localised communities can now have a more global outlook, and other more globally dispersed communities can now come together to collaborate and exchange information to a previously unprecedented degree.

The 19th-century German sociologist Ferdinand Tonnies defined "gemeinschaft", or community, as small geographically distinct, kinship-interwoven groupings characterised by intimate, overlapping, and stable relationships. The concept of community has evolved since then and communities are now defined in terms of social relationships, rather than in terms of space.

Communities are about people, identity, objectives and common interests, not technologies. Cothrel and Williams (1999a) found that the social element was critical to distinguishing a community from a mere group of individuals. Communities are groups of people who identify and interact around common, purposeful and mutually beneficial interests.

### 3.3 Developing a Successful Web Community

The Internet is increasingly being used to generate a sense of belonging (Hiltz and Wellman, 1997). For example, many spouses now use e-mail to communicate when one or both are travelling, and parents are now exchanging e-mails with their children attending college or university. The Internet is more frequently being used in the same way as letters and telephones were used to sustain traditional community relationships.

Web communities tend to be larger, more densely knit and more dispersed in time and space than off-line communities. "The Net erases boundaries created by time and distance, and makes it dramatically easier for people to maintain connections, deepen relationships,
and meet like-minded souls that they would never have met" (Kim, 2000, p.x). Web communities tend to have members with more heterogeneous social characteristics but with more homogeneous attitudes (Hiltz and Wellman, 1997).

In order for a Web community to be successful, it must be built upon solid foundations. "Web communities need 'social scaffolding' to grow and thrive. Social scaffolding refers to those aspects of a site - roles, rituals, features, events, and leadership - that facilitate community development. Much like a trellis enables a plant to grow, social scaffolding enables members to become progressively more involved in the community" (Kim, 1998). Simply launching a Web site with a bulletin board and chat facilities does not automatically generate a community (Mager and Karlenzig, 2001). There are numerous examples on the Web of quickly launched message boards with many topics but no responses. Creating gathering places alone is not enough - they need to be organised and integrated into the community. The central issues surrounding communities are people issues - Web technology merely acts as a facilitator, providing the tools for helping people come together (Cothrel and Williams, 1999a).

Cothrel and Williams (1999a) conducted a study of 15 online communities. They found that several respondents believed that the purpose of the community was to share knowledge and aid professional development. In order for a community to be successful and allowed to develop, the members must have a shared passion and be willing to openly share information between themselves.

In order to be successful and deliver true value to the users, the aims of the community must be clear. The first step is to understand the purpose of the community (Kim, 1998). Only then can real value be delivered to the target audience. Each community needs a purpose; there needs to be a distinctive focus, which gives the community a purpose to exist. Sharing a common purpose is the best first step to building a loyal community of members. It is vital to tap into this collective community-enabled purpose rather than focussing on individual goals. Web communities grow and thrive when members are able to fulfil their purpose and accomplish those goals that require other members to participate. The concept of collaborative purpose is one of the Web's premier strengths as a means of building community (Real Communities Inc, 2000).
3.4 Hierarchy of Needs

Humanist psychologist Abraham Maslow (1943; 1954) established a hierarchy of needs as a means of clarifying how individuals are motivated to satisfy needs ranging from lower level survival needs to higher-level self-fulfilment. Maslow's Hierarchy of Needs (see Figure 3.1) is based on a progression hypothesis, with individuals being motivated to satisfy lower level needs before focusing on higher level needs.

Figure 3.1: Maslow's Hierarchy of Needs

![Maslow's Hierarchy of Needs Diagram](source: Kim, 2000, p.8)

Kim (2000) has adapted Maslow's Hierarchy of Needs for use in building and developing Web communities (see Table 3.1).
Table 3.1: Maslow’s Hierarchy of Needs Within a Web Community

<table>
<thead>
<tr>
<th>NEED</th>
<th>OFFLINE</th>
<th>ONLINE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physiological</strong></td>
<td>Food, clothing, shelter, health</td>
<td>System access; the ability to maintain one’s identity and participate in a Web community</td>
</tr>
<tr>
<td><strong>Security and Safety</strong></td>
<td>Protection from crimes and war; the sense of living in a fair and just society</td>
<td>Protection from hacking and personal attacks; the sense of having a “level playing field”</td>
</tr>
<tr>
<td><strong>Social</strong></td>
<td>The ability to give and receive love; the feeling of belonging to a group</td>
<td>Belonging to the community as a whole, and to subgroups within the community</td>
</tr>
<tr>
<td><strong>Self-esteem</strong></td>
<td>Self-respect; the ability to earn the respect of others, and contribute to society</td>
<td>The ability to contribute to the community, and be recognised for those contributions</td>
</tr>
<tr>
<td><strong>Self-actualisation</strong></td>
<td>The ability to develop skills and fulfil one’s potential</td>
<td>The ability to take on a community role that develops skills and opens up new opportunities</td>
</tr>
</tbody>
</table>

Source: Kim, 2000, p.9.

Through adapting Maslow's Hierarchy of Needs for use in an online environment, it can prove easier to identify whether the needs and the purpose of the Web community are being met. As the needs of community members are satisfied, the community should thrive and develop.

Self-defined sub-groups form an important part of growing large-scale communities. However it is better to launch sub-groups later in the evolution of the community once the culture has become established and members have had the opportunity to communicate their needs and desires (Kim, 2000). Once the community has become established and members have begun to identify with the community, member-created sub-groups can be allowed to develop and provide the intimacy that was felt by members when the community was new (Preece, 2000).
3.5 Tools for Building a Web Community

For communities that are in their initial stages and still in the design phase, it is important that there is a degree of flexibility built into both the goals of the community and the technologies that will be used. Upon the launch of a community, it is best to begin with a few key gathering places (Kim, 1998). It is quality, not quantity that matters. From this initial base, members can extend and develop the gathering places according to the interest and purpose of the community. Community services can be implemented fairly quickly, but real self-sustaining community takes time to develop.

3.5.1 Backstory

The community's backstory provides a powerful tool in shaping members' expectations about the purpose and personality of the site (Kim, 1998). The term backstory comes from filmmaking and refers to the part of the movie's story that has happened before the first frame of the film. For example, in *Star Wars*, the backstory scrolls up the screen at the beginning ("Long, long ago, in a galaxy far, far away..."), setting the scene for the rest of the film.

Backstories introduce the community founders, communicate their motivation, and impact a sense of the community's core values. Individuals who were once newcomers to the community can communicate the backstory to the next wave of new members, thus developing a shared sense of history, depth and soul. Visitors form an initial impression of a site within the first few clicks. Therefore it is important that the backstory and the way that the site is laid out depict an accurate picture of the community.

3.5.2 Site Maps

A further way of breaking down initial barriers for new members is by providing a bird's-eye view of the community in the form of a site map (Kim, 2000). The site map gives an overall picture of the community space and may include links to each section of the community. The site map should be updated as the site evolves and sections of the community are augmented or added.
3.5.3 Feedback Loops

Communities evolve over time. Successful community building is a balancing act between management efforts to organise, plan and run the community space, and the ideas, suggestions and needs of its members. Through the implementation and maintenance of feedback loops, communities can evolve over time and keep in touch with the requirements of the members (see Figure 3.2). A good way of understanding the audience and gauging the level of satisfaction within the community is to conduct e-mail and form-based surveys. A member database system can be used to aid community-wide surveys. Regular surveys will help gauge the opinions of the community and enable members to re-inforce a sense of shared purpose.

Figure 3.2: Feedback Loops

![Feedback Loops Diagram]

Source: Kim, 2000, p. xvi
3.5.4 Member Database Systems

A member database system is crucial for creating and maintaining member profiles that evolve over time. This database can be used to control access to Web pages, mailing lists, chat rooms, conference areas and member profiles. The member database can also be used to develop a searchable directory, allowing community members to search for other individuals based on their member profiles. Many communities also allow members to develop their own home pages, thus helping each member develop their sense of belonging to the community (White, 2001). As Dorothy said in *The Wizard of Oz*, "There's no place like home."

The main stumbling block to building a member database can lie in convincing people to register. Many users are wary of divulging personal information but these concerns can be overcome by employing a sound privacy policy and making the use of the information clear to the user within the terms and conditions of membership. Members are more likely to disclose further information if they are aware that information provided will be kept private and used to help provide better services within the community. Trust can be built up by only asking for minimal information upon registration, with members having the opportunity to create a progressively more detailed profile as they become more comfortable with the community (Kim, 2000).

3.5.5 Frequently Asked Questions

New community members are likely to have several questions, many of which will have been asked (and already answered) by existing members. Addressing the needs and questions of newcomers without alienating established members is an ongoing balancing act. Therefore, it is good practice to create a Frequently Asked Questions (FAQ) section that answers the most common questions that a newcomer may have. The FAQ may also include instructional information if the community platform happens to be particularly complex. FAQs serve a key role in breaking down initial barriers for new users and making them feel more at ease with the technology and the community environment itself.
The FAQ can evolve over time, incorporating new details as the community evolves. The updated FAQ may be distributed to community members at regular intervals as a means of keeping them abreast of any updated versions of the FAQ. For example, several football club mailing lists distribute an updated mailing list to their subscribers at the start of each season. If there are several distinct categories of member within the community, it may also be necessary to create separate FAQs (Kim, 1998). Each FAQ can focus on answering questions of interest to each type of visitor, thus cutting down on the level of extraneous content that other groups have to read.

3.5.6 Communication Technology

"Communication is key to almost everything that humans do" (Schuler, 1997). Communication is at the heart of online communities. Internet technology plays a key role in aiding and supporting this democratic communication. The choice of appropriate communication tools and technology is vital when building a Web community. As shown in Table 3.2, community technologies can be public (interactions between several people) or private (one-to-one interactions); synchronous (messages are exchanged in real time) or asynchronous (messages are accumulated and users need not be online simultaneously).

<table>
<thead>
<tr>
<th>Rate of Communication</th>
<th>Type of Interaction</th>
<th>Public</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synchronous</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asynchronous</td>
<td>Private e-mail</td>
<td></td>
<td>Mailing list</td>
</tr>
<tr>
<td></td>
<td>Electronic postcards</td>
<td></td>
<td>Bulletin boards</td>
</tr>
<tr>
<td></td>
<td>Instant messaging</td>
<td></td>
<td>Conferencing systems</td>
</tr>
<tr>
<td></td>
<td>Private chat sessions</td>
<td></td>
<td>Text chat rooms</td>
</tr>
<tr>
<td></td>
<td>Buddy lists</td>
<td></td>
<td>MUDs/ MOOs etc.</td>
</tr>
<tr>
<td></td>
<td>Internet telephony</td>
<td></td>
<td>VRML/ avatar chat</td>
</tr>
</tbody>
</table>

All communities need a mixture of public and private meeting places. It can often prove difficult to identify a single space where the Web community 'lives'. This is because members use a range of tools depending upon their circumstances and requirements (Cothrel and Williams, 1999a).

### 3.5.6.1 Chat Facilities

Real-time chat is a frequently misused community technology (Steuer, 1998). Nothing discourages users more than an empty chat room, or an interactive event that has very little or zero interaction between users. However when utilised correctly, real-time chat can be a very effective communication medium. Instant messaging can be used to keep a 'buddy list' of compatriots who use the same system (for example, MSN messenger and Yahoo! instant messenger). 'Buddy lists' were pioneered by AOL, and allow users to check which of their 'buddies' are currently online so that they can then initiate chat sessions.

Traditional 'real world' communities often meet at regular times. This custom can be applied to Web communities and real-time chat can be used more effectively by announcing virtual meetings or seminars in advance. This will enable members to gather in the chat rooms at allotted times to discuss specific issues. Regular online meetings can add a sense of liveliness to the community, help build relationships between members and bond the community together. Suggestions can be taken via e-mail so that both the frequency and focus of events can be accordingly tailored to the needs of community members. Chat facilities can also be used by smaller sub-groups within the wider community. However large-scale chats may require skilled moderators to prevent the chat from developing into chaos (Salmon, 2000).

Online chats can be extended to incorporate interviews. This would involve a leading figure in a particular field participating in a moderated question and answer session with community members. Through conducting interview sessions with industry leaders, communities can attract new members and keep current members interested and involved.
Interview transcripts can then be forwarded to community members who have registered an interest in particular topics.

### 3.5.6.2 Electronic Mail

The use of e-mail is widespread and as such, it is an extremely powerful communication medium that may be used to hold a community together. E-mail distribution lists may be used for making announcements and for encouraging communication between users. A community newsletter can serve a key role in keeping members up to date with key events or issues that may arise within the community. E-mail can also be used to encourage feedback and suggestion from community members. Poling (1994) found that the use of e-mail enhanced the quality of communication within groups and ultimately aided group cohesion. In communities where there are sub-groups, separate mailing lists or newsletters can also be adapted to cater for the needs of each group of members. However it is important to note that e-mail is also very easy to abuse, creating useless junk mail or ‘spam’, which may alienate the community.

### 3.5.6.3 Mailing Lists and Bulletin Boards

Community mailing lists can facilitate conference-style interaction between community members. However mailing lists do not create the same sense of gathering in a location with fellow community members that conference-style interaction can provide (Steuer, 1998). Therefore, conference-style mediums such as bulletin boards play a crucial role in community development. Bulletin boards can unite geographically dispersed groups and enhance their sense of belonging and community. The asynchronous aspect of online discussion allows community members to check bulletin boards at their discretion and also enables them to be more reflective in their comments (Cothrel and Williams, 2000). The use of bulletin boards also encourages multiple conversations within a given topic, allowing the community to sub-divide into specific interest groups and as threads develop, people can choose to focus only on those threads of interest to them (Kim, 2000). Bulletin boards can also act as a platform for asking answering any questions that may not be covered by the FAQ, as well as supporting the community's sense of context and history.
Cothrel and Williams (1999a) found that community members tend to use newsgroups and bulletin boards to establish initial contact, but have their most valuable exchanges via e-mail. They found that newsgroups and bulletin boards were mainly populated by newcomers and the knowledge-poor rather than the knowledge-rich. Therefore, absence of activity in a designated online space does not necessarily mean that the community is failing. "Listservs, distribution lists and the like have become the de facto 'town hall' " (Cothrel and Williams, 1999a, p24). Such evidence highlights the importance of broadening the definition or scope of the community so that all interaction between the community can be recognised as potentially value creating rather than focussing on the interactions that take place within a narrowly defined space.

**3.6 Providing Support for Online Communities**

It is possible to draw an analogy between a solid community and a good party. The sign of a good party is that the host can leave the room and the conversation continues. Many Web communities exhibit an excellent level of self-management while others need to be shaped and require a significant investment of time and effort to maintain (Cothrel and Williams, 1999b). Many Web communities need to be managed, either formally or informally, especially in their embryonic stages. Cothrel and Williams (1999b) found that the effort required to maintain a community is almost always greater than the effort required to launch the community. The need for a leadership structure will grow as the community grows. As hot spots develop within the community, there needs to be a mechanism for managing and dealing with the increase in traffic.

Effective leadership programmes evolve with the member base. When members are willing to help the community thrive by acting as leaders, experts, information sharers or mentors, this indicates that the community is something that people value. A sign of a thriving online community is that members are willing to adopt an informal role in supporting and promoting the community. Enthusiastic volunteers can often prove to be the best hosts because they are doing it out of love rather than for money (Kim, 2000). While some regular visitors to the community space may be readers or observers, enthusiasts actively contribute to the community by making thoughtful contributions to debates or through making sound suggestions for events. By spotlighting these enthusiasts
and their useful contributions, this should encourage further similar contributions from the wider community.

Community members may be reluctant to participate in ongoing conversations or more intense topics (Rossman, 1999). Facilitators or moderators can enhance the community by fostering member interaction, providing stimulating material for conversation and helping members adhere to the stated guidelines, rules or norms of the community (White, 2001; Salmon, 2000). "Good hosts are invaluable; they welcome new members, keep discussions on-topic, and deal with troublemakers" (Kim, 1998). As communities mature, some conversations may start to recycle as new members join. Moderators serve a key role in regularly starting new conversations and threads, so that a range of members can be engaged or re-engaged.

Community moderators and hosts should also enforce any community standards or codes of conduct. Community members should agree to the terms and conditions of membership of the community prior to registration and it is the role of the community moderators to enforce these rules. As outlined previously, the terms and conditions serve a key function in building up trust with the members. By enforcing these rules, the community establishes and maintains credibility with the members (Kim, 1998; Kim, 2000).

3.7 Measuring the Success of Online Communities

Having established an online community, it is important to measure the success of the community. Dan Shafer (1999) suggested a wide range of measures for gauging the success of online communities. These are as follows:

1. **Unique visitors**: This means that there is no duplicate counting of visitors.
2. **Page views**: This measures the number of 'hits' that a site receives. This can also include e-mails received on topics of particular interest (see below - postings per month).
3. **Registered members**: This includes all subscribers to the site.
4. **Active members**: This only includes registered members who have actually visited the site.
5. **Subscriptions**: This is a count of all registered members (as outlined above). This allows for duplicate counts of registered members who participate in multiple communities or sub-communities. For example, a subscriber may be a participant in more than one community in a multi-community site. Therefore, subscriptions include the aggregate total of members of all our communities, allowing for duplicate membership by members.

6. **Postings per month**: This includes message board and mailing list postings. Chat postings may be counted separately. There are two types of e-mail - general-interest e-mails that go to the entire community, and specific e-mails that only go to participants in a particular conversation or to those people who have specifically expressed an interest in being included in discussions on a particular topic.

7. **Time on site**: This is a measure of the average session of each user.

8. **Posting ratio**: This measures the number of postings per page view.

9. **Penetration ratio**: This is a measure of unique users to total active users. The penetration ratio can be calculated for each topic area of the site.

The level of participation by members within communities varies between individuals. Some take an active role in the community, contributing to discussions, or providing fellow members with assistance. Others merely read what others have posted without personally taking an active role.

Warms et al (2000) found that, in the sites they examined, readers outnumbered posters by 10 to 1 or more. Therefore, more than 90% of the total community population who regularly visit a community fail to post, choosing instead to use the information they gain without taking an active role. However, it is difficult to gauge the success of a community by examining the posting ratio in isolation. The true value of information lies in examining what it is used for. An individual may play both active and passive roles over the course of their membership within the community. For passive members, the experience of obtaining valuable information builds a sense of indebtedness that will undoubtedly be expressed in contributions when that person has something of value to share. Therefore the greater the level of participation that occurs in the community over a period of time, the greater the value created for the members and community administrators.
Posting ratio does not measure the usefulness of the information posted nor the use to which passive members of the group may put this information. This is especially important since the vast majority of initial community members are passive (Mager and Karlenzig, 2001). Thus a more useful measure of the success of an online community may be gleaned by considering a wider range of measures and taking a more holistic approach as outlined by Shafer (1999).

3.8 Summary

This chapter has outlined the key issues and concepts involved in constructing a successful Web community. An overview of the key tools needed to build a thriving community, delivering true value to its member base, has been given. Community services can be implemented fairly quickly, but real self-sustaining community takes time to develop and may involve the use of community facilitators or moderators.

In order for a community to be successful and allowed to develop, it must meet the requirements of its members. The members must have a shared passion and be willing to openly share information. Web communities grow and thrive when members are able to fulfil their purpose and accomplish those goals that require other member to participate.

In Chapter 5, the concepts discussed within this chapter will be applied to the community of Scottish computing teachers.
Chapter 4: Methodology

4.1 Introduction

This chapter will outline the research objectives of this study and discuss the research methods used throughout the process of the study. The methods used to gather data, and the techniques used to conduct the analysis of primary and secondary data will be outlined.

4.2 Research Objectives

As outlined in Chapter 1, this dissertation aims to examine the key areas involved in delivering continuing professional development to a Web community. Chapters 2 and 3 have highlighted the key points that have been identified via an intensive literature review, and these issues will be further examined via the case study in Chapter 5.

4.3 Research Design and Sources of Data

In order to fulfil the objectives of this research, careful consideration was given to the overall configuration of the research process so that questions regarding the reliability, validity and generaliseability of the conclusions drawn are robust enough to stand up to outside scrutiny. In conducting this research, both primary and secondary research has been conducted.

Extensive secondary research has highlighted the key issues involved in Web communities and professional development, thus formulating a deeper insight into the research objectives. These issues have been examined in depth in Chapters 2 and 3. External sources used throughout this study were gleaned from a wide variety of sources including:

- Books
- Academic Journals
• Online Journals
• Newspaper and magazine articles
• Internet

A major advantage of using secondary data is the savings made possible in terms of time and money, especially given the time limitations of this study. The use of secondary data also makes it possible to build a detailed contextual picture of the subject area under investigation (Saunders et al, 1997).

Primary research was conducted via a case study. The case study approach gives a richer understanding of the context of the research and is particularly appropriate for individual researchers because it gives an opportunity for certain aspects of a problem to be studied in some depth within a limited time scale (Bell, 1993).

The community of teachers of computer courses at Scottish schools was chosen as the case study. The community is made up of two main areas:

• Scottish Teachers Online Resource Material (STORM)
• Yahoo! Groups for teachers of computing courses

The online course material provided by STORM acts as a resource for teachers to be used in aiding the professional development. The Yahoo! Groups present a forum where teachers can discuss teaching methods and other matters relating to their day-to-day work.

4.4 Analysis of Data

In conducting this research, data covering the twelve-month period between July 2000 and June 2001 has been gathered and analysed.

4.4.1 STORM Data

Data concerning STORM site traffic is stored in Web logs. These Web logs were analysed in two ways. Firstly, the WebCT log was analysed to gain the following information:
• Listing of all registered STORM members
• Dates when members first accessed the STORM site
• Number of members accessing the bulletin board area

Any users that, according to the WebCT log, have yet to access the site are classed as being inactive. Despite having registered to use STORM, inactive users have never actually logged on to the site.

Secondly, the raw Web log data is analysed using a Clickstream Analysis Tool. This tool was implemented using Java and was developed by Gordon Macleod (2001), as part of a dissertation project at the University of Strathclyde. The tool returns an analysis of the total monthly number of hits that each page receives. The tool also returns a monthly analysis of the pages that each registered user accesses during their time on the STORM site. This data was further analysed to gain totals for:

• Unique monthly visitors
• Total monthly sessions

Unfortunately, due to an error in the raw Web log data for the months of March 2001 and May 2001, it was not possible to analyse any of the data in these months using the Clickstream Analysis Tool. Therefore, only ten months data has been analysed using the Clickstream Analysis Tool.

In addition, no data is available concerning the length of time that users spend on the site. Thus it is not possible to analyse the average length of a session for each user.

4.4.2 Yahoo! Groups Data

By subscribing to the Yahoo! Groups relating to the teaching of computing courses in Scottish schools, it was possible to gain access to the database of mailing list members, along with a full listing of messages posted to the mailing lists since the launch of the Yahoo! Groups. This data was analysed in order to gain an understanding of any patterns
in the communication between members. The following data was gathered from the Yahoo! Groups:

- Monthly member numbers
- Monthly message numbers

Through interrogation of all messages posted to the Yahoo! Groups since their launch, it was also possible to collate a list of all mailing list postings mentioning the STORM site. Therefore, it is possible to gain an insight into the opinions of the Yahoo! Group members about the content and quality of the materials on the STORM site.

4.5 Limitations of Research Methodology

The research methods used in this study have been identified as being most suitable in terms of meeting the research objectives. However there are some limitations attached to the chosen methodology.

It would have been both insightful and more informative to conduct a wider number of case studies, expanding the scope and scale of the research. However this was not possible due to time constraints and the lack of availability of further professional Web communities that are at an advanced state.

For reasons of cost and convenience, the STORM site and the Yahoo! Groups were solely examined by the author of this research. Since one individual carried out the research, some of the views expressed in this study may be subjective in nature.

Due to the unavailability of data about STORM's site traffic in two out of the twelve months studied, the data concerning STORM cannot be relied upon to any great degree. Further studies, analysing the data over a wider timescale, are required in order to draw any serious conclusions about the success of STORM in delivering professional development to the teaching community.
Given that only one professional community has been examined, it is recognised that the findings may not be consistent with a wider range of professional Web communities. This research aims to provide a preliminary framework that could form the basis for a more comprehensive study. Therefore, further research in this area may extend the study to a wider range of professional communities.

4.6 Presentation of Findings

Discussion, findings and analysis relating to the research objectives are presented in Chapter 5. Theories developed in Chapters 2 and 3 will be applied to the case study of STORM and the Yahoo! Groups. This will provide a valuable insight into the process of delivering continuing professional development to a Web community.
Chapter 5: Community of Scottish Computing Teachers

5.1 Introduction

This chapter will present the findings, analysis and discussion of the Scottish computing teachers' Web community. This will involve an analysis of Scottish Teachers Online Resource Materials (STORM) along with Yahoo! Groups that were specifically set up to facilitate discussion between teachers of computing courses at Scottish schools.

In addition, this primary data will be tested against the theories outlined in the literature review in Chapters 2 and 3.

5.2 Overview of STORM

Scottish Teachers Online Resource Modules (STORM) was launched in May 2000 and is the result of a joint venture between the University of Strathclyde and the Scottish Executive Education Department (SEED). STORM is aimed at providing support for the development of online material for teachers of computer courses at Scottish schools (Computing and Information Systems). The University of Strathclyde has developed the content of the site over the period since the launch of STORM and new material is still being added at regular intervals. The Department of Computer Science at the University of Strathclyde has worked closely with the Department of Business and Computer Education at Jordanhill, practising teachers and others to develop and support the material on the STORM Web site.

The material was not designed for direct classroom use with students, but rather as a resource that could be used by teachers to aid their professional development. The purpose of the STORM material is to provide teachers with the necessary additional skills and confidence to enhance and enable their role in the classroom. The material on the STORM Web site has been designed to provide support for teachers in three main topic areas:
Databases forms part of the material taught by Information Systems teachers, while Networking and Multimedia form part of the material for the Computing course (see Appendix A). Each of the three modules is made up of different units of course material, with each unit of course material consisting of different topic areas.

In an attempt to encourage individual teachers to act as moderators and take a leading role in helping to develop the material on the site, the University of Strathclyde offers a Postgraduate Certificate for those who are willing to participate in the development of coursework related to the materials. It was intended that this would create a multiplier effect, with the wider community benefiting as more teachers take up an active role.

As well as providing online material for teachers, STORM provides several tools on the site, aimed at engaging debate and discussion about the subject matter of the material. These tools include chat rooms, bulletin boards, e-mail and search facilities. There are also links to other sites that may be of direct interest to teachers of computing course (see Figure 5.1). These links include the Scottish Qualifications Authority and the Higher Still Development Unit.
5.3 Registration

Only registered users are able to log in to the main area of the STORM Web site. Registration is only open to members of staff in Scottish schools and colleges who are involved in teaching national qualifications in Computing and related subjects. The first stage of the registration process is carried out online (see Figure 5.2).
Figure 5.2: STORM Registration

The administrators of the STORM site validate this online form. Upon validation of successful applicants’ registration, a user ID and password are forwarded to the applicants at the address of their institution. STORM administrators usually process registration applications within a period of seven days. A copy of the standard letter that is sent to those who are successful in registering with the site is included in Appendix B. Those applicants considered ineligible are notified of this via e-mail.

5.4 Publicity

STORM was first publicised via presentations at seminars in May 2000 when teachers were first introduced to the new Higher Still programme. Thereafter, the site has been further publicised via discussion in those Yahoo! Groups that are populated by teachers of Computing and Information Systems at Scottish schools. See Appendix G for a brief overview of the Yahoo! Groups related to the teaching of computing in Scottish schools.
A monthly analysis of mentions of STORM within the Yahoo! Groups is included in Appendix H.

There was a further wave of publicity in March 2001 when the administrators of the STORM site e-mailed all registered members to notify them of the availability of the first unit of the Networking material. The e-mail encouraged users to give feedback on the future implementation of new features within the site. As discussed in Chapter 3, the use of feedback loops is vital in gauging satisfaction and keeping in touch with the requirements of members. A copy of the e-mail that was sent to members is included in Appendix C.

STORM administrators plan to further publicise the site when all Multimedia and Networking materials have been fully added to the site in late September 2001. Further publicity and encouragement of the existing member base is certainly required since only 65.32% of the total number of registered users has ever accessed the STORM site (see Appendix D). Furthermore, the penetration ratio, measuring the number of unique visitors against total active members, peaked at only 49.11% in August 2000 (see Appendix E).

### 5.5 Key Dates in the School Calendar

Given that STORM is a resource for schoolteachers, it is important to consider the key events and dates in the school calendar in addition to important dates relating to the STORM site. See Table 5.1 for a breakdown of the key events and dates for STORM since its launch as well as school holiday and exam dates throughout the year.
Table 5.1: Key Dates and Events in the School Calendar

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 2000</td>
<td>STORM launch and publicity at teacher seminars</td>
</tr>
<tr>
<td>May 2000– mid-June 2000</td>
<td>Final examinations (2 – 3 weeks)</td>
</tr>
<tr>
<td>July 2000– late August 2000</td>
<td>Summer holiday (6 – 8 weeks)</td>
</tr>
<tr>
<td>Mid-August 2000</td>
<td>Start of school term</td>
</tr>
<tr>
<td>Mid-October 2000</td>
<td>Mid-term holiday (1 week)</td>
</tr>
<tr>
<td>Late December 2000 – early January 2001</td>
<td>Christmas Holiday (2 weeks)</td>
</tr>
<tr>
<td>Early January 2001</td>
<td>Preliminary examinations (2 – 3 weeks)</td>
</tr>
<tr>
<td>Mid-April 2001</td>
<td>Easter holiday (2 weeks)</td>
</tr>
<tr>
<td>May – mid-June 2001</td>
<td>Final examinations (2 – 3 weeks)</td>
</tr>
</tbody>
</table>

Teachers are most likely to access the site during term time and before periods of examination. There is also likely to be a flurry of activity whenever new material is added to the site or when there is any publicity.

Unfortunately, due to the lack of Web log statistics concerning site traffic around the period when the site was publicised via e-mail to all registered users (March 2001), it is not possible to see either the direct effect of this extra publicity, or the addition of the first part of the Networking material. However, there should be a secondary effect in April with extra people continuing to visit the site. As outlined in Chapter 4, there is also no detailed analysis of the site traffic available in May 2001.

5.6 Backstory

As outlined in Chapter 3, the backstory plays a key role in communicating the purpose and motivation of any community. When users access the STORM site, the backstory is the first thing that they are faced with (see Figure 5.3). The STORM backstory has also been communicated to a wider audience via postings to the Yahoo! Groups mailing lists.
Figure 5.3: STORM Backstory

STORM's backstory emphasises the point that the site is aimed at aiding professional development within the teaching community. STORM overcomes the most common initial problems of building Web communities - that of a common goal or purpose. By focussing on a collective community-enabled purpose rather than individual goals, the community has a greater opportunity to thrive and develop. The STORM backstory encourages active debate and discussion from members, aimed at providing further benefits to the wider community. The fact that STORM is backed by the Scottish Office adds a sense of legitimacy, making the content of the site directly useful to teachers of computing courses in their everyday work, and should encourage active participation within the community.

5.7 Site Map

A useful tool for newly registered members is the site map. This is found under the tools menu and provides a link to each of the main sections of the STORM site (see Figure 5.4).
The STORM site map is automatically updated to include links to all newly added course material.

Figure 5.4: STORM Site Map

Although new sections are automatically added to the site map, STORM fails to give an indication of when content was newly updated or added to the site. It would be useful to members if such information were clearly stated on the front page of the site, thus giving an indication of whether the site is up to date and what new information, if any, is available to members. E-mail updates could also be sent to members whenever new material comes online.

In addition, the site could give an indication of planned future updates and when further content is likely to be added to the site. This would be particularly useful for sections of the site that are currently evolving such as the Networking and Multimedia.
Members are also able to search the course content and bulletin board archives for material of interest on the STORM site by using the Search facilities. STORM has gone some way towards giving an indication of new messages, with the bulletin board and e-mail icons changing when there are new messages which have not yet been read by members (see Table 5.2).

Table 5.2: STORM Message Icons

<table>
<thead>
<tr>
<th></th>
<th>![Icon]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Bulletin Board Icon</td>
<td>![Icon]</td>
</tr>
<tr>
<td>Unread Bulletin Board Messages</td>
<td>![Icon]</td>
</tr>
<tr>
<td>Standard E-mail icon</td>
<td>![Icon]</td>
</tr>
<tr>
<td>Unread E-mail Messages</td>
<td>![Icon]</td>
</tr>
</tbody>
</table>

5.8 Member Database System

As at June 30 2001, STORM had 444 registered members (see Appendix D). The only data that is held on each member is the information that is collected at the time of registration. This information is as follows:

- Name
- E-mail Address
- Institution Name
- Department
- Institution Address
- Telephone Number
- Username
For the majority of Web communities, the main stumbling block to building a member database lies in convincing users to register to use a site. STORM has overcome this common problem since only registered users are allowed to access the material on the site. The links to the University of Strathclyde and the SEED have also helped to build up this initial trust within the member base. However, STORM has failed to take advantage of this sound initial base and allow members to create a progressively more detailed profile.

As discussed in Chapter 3, a member database can be used to gauge the views of members via e-mail and form-based surveys. STORM has done this via the e-mail that was sent to members in March 2001. Further e-mail surveys, requesting the views of members, could be used to reinforce a sense of shared purpose within the community.

An extended member database could be used to identify teachers with similar interests. At the very least, a more detailed member database could be used to identify which of the users would be interested in Databases material (Information Systems teachers) and those interested in Networking and Multimedia material (Computing teachers). A more extensive searchable database system could also be used to help users identify fellow community members with particular interests in specific modules of the Higher Still programme. A searchable member database could also be used to identify members teaching in similar areas of Scotland. This could enable teachers to arrange ‘real world’ meetings so that they could discuss issues face-to-face.

As the member database and the community evolve, members could be allowed to develop their own content. STORM administrators are investigating the feasibility of providing a STORM upload service, enabling members to exchange teaching-related materials via the protected STORM environment (see Appendix B). However, given the nature of the STORM site and its links to the SEED and the University of Strathclyde, the content would have to be a useful resource that could be used by fellow teachers to aid their professional development.

Members of the Yahoo! Groups populated by Scottish teachers have access to a more extensive database of information concerning their fellow mailing list members. All members of the mailing lists are able to access a list of fellow subscribers, along with the
date on which they joined the list. The member database also gives an indication of which subscribers are currently online.

As is standard practice with all Yahoo! Groups, members are also able to create their own profiles that they can choose to make public to other members. In addition to a searchable member database, Yahoo! Groups have a facility that allows members to upload files to the group. These files can be accessed by all group members and typically include teaching materials for use in the classroom as well as a copy of the mailing list FAQ.

5.9 Frequently Asked Questions

There is no official overall FAQ section within the STORM site. However, much of the material that would form part of any FAQ section is included within the Introduction, Getting Started and Tools sections of the STORM site. These sections include information relating to the course content, chat rooms, bulletin boards and internal e-mail system.

Within the Databases material, there is an individual FAQ section specifically relating to the Databases content (see Figure 5.5). Conversely, there is no such facility within the networking material. As the course material develops, FAQ facilities could be extended to cover all distinct areas of course material, addressing common questions from the member base.
Chapter 5: Community of Scottish Computing Teachers

5.10 STORM Course Material

The central STORM course materials have been split into the three main topic areas (Databases, Multimedia and Networking) and the material is presented using Macromedia Flash. In order to view the material, users must have the Macromedia Flash Plug-in. A link is provided to the Macromedia Flash site should users need to download the plug-in. An example of the course content is shown in Figure 5.6.
Figure 5.6: STORM Course Content

A. STORM Navigation - allows users to move between topics, view the list of topics within a particular unit, or return to the STORM course material homepage.

B. Toolbar - used to access the search facility, chat rooms, bulletin board, STORM e-mail or the note-taking tool. Users can access help on these toolbar items via the Tools icon within the STORM course material homepage.

C. A listing of the topics covered in a particular unit.

D. The actual course content. The material is presented using Macromedia Flash. Users can navigate through the material using the Flash navigation toolbar, which is located in the bottom right hand corner.


An overview of the 3 different course units (Databases, Networking and Multimedia) is supposed to be given in the introduction section of the site. However, despite the fact that both Databases and Networking material are available on the site, only an overview of the Databases is unit is available on the site (see Figure 5.7). There is also no mention of when the Multimedia units will be available, either in the Introduction section or in the main Multimedia section of the site.
Chapter 5: Community of Scottish Computing Teachers

Figure 5.7: STORM Introduction Section

The STORM course consists of 3 different units: Databases, Networking and Multimedia. Each unit in turn is composed of a number of sub-units, and each sub-unit is comprised of smaller topics. Each topic is represented as a screen, or several screens of viewable material.

**Databases**

Database technology is important in a wide range of applications. Early business use of such systems concentrated on applications such as the maintenance of parts inventories and the production of accounts. More recently, applications of databases have been used to support decision making in business and as the underlying technology behind e-commerce systems.

The aim of database management systems (DBMS) is to provide access to data for users and/or applications. One of the important ways of achieving this aim is for the DBMS to ensure an application or user sees a consistent view of the data even when the structure changes. Database management systems support a data model. This is an abstraction of the data that allows the user to picture the structure of the database. The most common model for databases currently being developed is the relational model. The Web learning materials start by presenting a description of the relational model.


The course material included within the STORM site is more advanced than is required for everyday use in the classroom by schoolteachers. Therefore, it is an excellent resource for those teachers wishing gain a deeper understanding of the topics and aid their professional development. The STORM site and the material included within it meet all of the criteria laid out by Hixson and Tinzmann (1990) concerning the usefulness of technology in aiding and enhancing continual professional development:

2. Opportunities to review information that has been presented.
3. Opportunities to discuss key issues and concepts with peers and experts via online debates and forums.
4. Opportunities for coaching and feedback.
5. Access to 'expert systems' for support in decision-making and problem solving.
6. Opportunities to make thinking processes more visible and explicit.
7. Provision of rich context environments for learning via visual media.
A poll was carried out within the Yahoo! Information Systems Group in April 2001. The poll asked mailing list members to give their opinion on the quality of the online materials on the STORM site. The poll question and results were as follows:

**POLL QUESTION:**
- I think the quality of the STORM materials is...

**CHOICES AND RESULTS:**
- Very High 0 votes 0%
- High 5 votes 83.33%
- Low 1 votes 16.67%
- Very Low 0 votes 0%

Given that this Yahoo! Group had 395 members as at the time of the poll, only 1.52% of the group membership (6 members) participated in the poll. Therefore, the results of the poll cannot be relied upon as being a representative depiction of the opinions of the group as a whole. In order to gain a more accurate depiction of the opinion of the community, a more extensive poll, incorporating the opinion of a wider proportion of the group membership is required.

### 5.11 Chat Room

The STORM Chat tool enables users to take part in real-time conversation with other registered members. There are six chat rooms in total. Of these, there are four chat rooms in which conversations will be recorded:

- Databases
- Networking
- Multimedia
- Social (informal)
In addition, there is a general chat room for STORM and a general chat room for all courses (see figure 5.8).

**Figure 5.8: STORM Chat Facilities**

![STORM Chat Facilities](image)

As is standard practice with the majority of chat room facilities, users click on a particular room to enter it. The chat applet displays other users who are present in the same room. In addition to posting messages to the entire room, users can send private messages to other users by clicking on their names.

Despite the wide range of chat facilities on offer in the STORM site, there has been a very low level of usage from the members. See figure 5.9 for a graph of the number of members using the chat room facilities throughout the period between July 2000 and June 2001.
The number of members accessing the chat rooms was at its maximum in January 2001, with the number of hits peaking at 15. However, given that there are six chat rooms and there were 176 registered members at the start of January 2001 (see Appendix D), the chat rooms are being significantly under-utilised by the community.

The fact that there are six separate chat rooms on the STORM site may be discouraging users from accessing the facilities. Coupled with the fact that the maximum level of usage in one month has peaked at 15, it appears highly unlikely that two users will have been present in a single chat room at the same time. As discussed in Chapter 3, community members are more likely to be discouraged from using the facilities when there are extremely low levels of interaction between users.

It may have been more advantageous to launch the STORM site with only one chat room. Once a sense of community had developed and the level of communication within the chat rooms had reached a certain level, further chat rooms could have been added for each sub-group. It may also have been beneficial to arrange regular online events or meetings. Not only would this have helped members develop a sense of ease with the chat facilities, it would have helped build relationships between members and bonded the community together. Online chats could also have been specially arranged to involve the authors of
the online course material, thus providing an invaluable opportunity for gathering feedback on the material.

5.12 Bulletin Board

The bulletin board within STORM is split into five main areas. In addition to the three forums specifically relating to the course material, there is a Main forum and a Notes forum (see Figure 5.10)

![Figure 5.10: STORM Bulletin Board Forums](http://storm.cs.strath.ac.uk/STORM/bulletin/figure5.10.png)


As can be seen from Figure 5.10, only 14 messages have been posted to the bulletin board since the launch of STORM. Of these 14 messages, there have been only 9 individual members who have contributed to the bulletin boards (see Appendix D). The majority of the members contributing to the bulletin board are STORM moderators.
A more encouraging statistic is the number of hits that the STORM bulletin board is receiving. Despite members’ reluctance to take a more active role and contribute to the bulletin board forums, they do appear to be reading the content (see Figure 5.11).

Despite the fact that there are significantly more users reading the bulletin board than there are posting messages, the bulletin board penetration ratio, measuring the number of bulletin board hits per active member, is still very low (see Figure 5.12).
Since the start of the school term in August 2000, there has been a general downward trend in the percentage of active members reading the bulletin board. There was a slight rise in April 2001 following the extra publicity of the site to the members, but even at its highest point, the bulletin board’s penetration ratio is still some way short of the level of activity that would be expected on the bulletin board.

5.13 STORM E-mail System

Within the tools on the STORM site, users have access to an internal e-mail facility which can be used to e-mail fellow registered members. However, given the low level of postings to the bulletin board and the lack of a searchable database system, it is extremely unlikely that any users are actually aware of the e-mail address of more than a handful of fellow users. In fact, the number of hits to the e-mail facility peaked at 11 in August 2000 (see Figure 5.13).
Given that there were 88 active members of the STORM site at the start of August 2000 (see Appendix D), the peak of 11 hits represents only 12.5% of the total number of active STORM users. This is especially low since e-mail is widely accepted as being the primary communication tool for members of an online community.

5.14 STORM Members Accessing the Online Course Material

Of the three modules on the STORM site, only Databases is a compulsory unit within the Higher Still programme (see Appendix A). The STORM module on Databases is a mandatory unit within Higher Information Systems. The other two STORM modules, Networking and Multimedia, are both optional units within Higher Computing.

Given that students need only sit one of the four optional units within Higher Computing, Networking and Multimedia may not necessarily be taught by many of the teachers registered to use the STORM site, and this may have an impact on the number of members accessing these modules.

Members are accessing the online course material on a more frequent basis than they are accessing the communication tools including the bulletin board. In fact, even though there
is no Multimedia material on the STORM site, there was not a single month in which the number of visitors to the bulletin board exceeded the number of visitors to the Multimedia section of the site.

The number of members accessing the Databases modules rose from July 2000 until November 2000 before falling at Christmas 2000. There was a steep rise in the number of members accessing the Databases module between February 2001 and April 2001. This rise could be accounted for by the publicity e-mail sent to all registered members in March 2001. This rise in hits to the Databases section also coincides with the full Databases unit being online in its entirety (see Figure 5.14).

There was a steady flow of hits to the Multimedia module, despite there being no content in that area. This is a clear indication that there is a demand for this content, and site traffic should increase when this material goes online.

There was a similar flow of hits to the Networking module before any content went online in March 2001. Unfortunately there is no data available for March 2001, but there is a clear secondary effect in April 2001 with a rise in the number of members accessing the material. The amount of traffic to the Networking section continued to rise to a peak in June 2001 (see Figure 5.14). Given that new material is still being added to the Networking section, the number of hits should continue to rise.
The penetration ratio of the course material, giving a measure of hits to active users, shows that the percentage of active users accessing the Databases section reached its peak in November 2000 with almost half of the active members accessing the material. Thereafter, the penetration ratio dropped quite sharply before rising once again in April 2001. This rise in April 2001 coincides with the Databases section being online in its entirety and with the publicity e-mail sent to all registered members (see Figure 5.15).

The penetration ratios for the Multimedia and Networking sections of the site moved closely with each other until the first section of the Networking material went online in March 2001. Thereafter, the penetration ratio for the Multimedia section remained at similar levels to previous months, while the Networking section experienced steady increases in its penetration ratio. The penetration ratio for the Networking section reached its peak in June 2001, outstripping the penetration ratio for the Databases material.

At its peak, the maximum penetration ratio of the Networking material (24% in June 2001) was less than half the maximum penetration ratio of the Databases material (50% in November 2000). However, given that the Networking material had only been online for 3 months and that the Networking modules were incomplete, the penetration ratio for the
Networking material would be expected to rise over the coming months as more material goes online.

Figure 5.15: STORM Modules Penetration Ratios

![Course Material Penetration Ratio](chart)

5.15 Moderators

The STORM moderators come from a range of sources. The Scottish Executive inspectorate suggested some people who would be suitable, and the University of Strathclyde identified and approached further individuals.

Administrators and moderators have posted the vast majority of the messages on the STORM bulletin board. As discussed earlier in this chapter, their postings have failed to encourage the more passive members of the community to participate through posting messages.

The moderators have also posted messages publicising STORM to the Yahoo! Groups. This has sparked a few discussions about STORM in the Yahoo! Groups. However there have been a total of only 43 messages mentioning STORM in the Yahoo! Groups throughout the period between June 2000 and June 2001 (see Appendix H).
Further postings to the Yahoo! Groups would undoubtedly help to publicise STORM and should lead to an increase in site traffic. However, the moderators do have a heavy workload outside of the STORM site and this is undoubtedly a major consideration in deciding how and when to publicise the site.

5.16 Yahoo! Groups

As discussed earlier in this chapter, there are two main Yahoo! Groups populated by teachers of computer courses within Scottish schools. These are as follows:

- Higher Still Computing
- Information Systems

With relevance to STORM, the Networking and Multimedia modules form part of the Computing syllabus (see Appendix A). The third STORM module on Databases forms part of the syllabus for Information Systems. Despite their titles and remit, there is a fair degree of crossover in subject matter between the two Yahoo! Groups, and it is not uncommon for copies of the same message to be posted to both groups. Both mailing lists were launched prior to STORM. Therefore it is to be expected that there will be a higher incidence of communication between community members than is apparent within the STORM site.

5.16.1 Yahoo! Information Systems Group

During the summer holidays in July 2000, the number of messages posted to the mailing list was negligible. The number of messages reached a peak of 113 soon after the start of term in September 2000. The number of messages dropped around the time of the school mid-term holiday in October before rising to a steady level between November and January. The number of messages dropped substantially in February 2001 before rising again just before the Easter vacation in March 2001 (see Figure 5.16).
Figure 5.16: Monthly Messages in the Information Systems Group

The posting ratio, measuring the number of messages posted per mailing list member was at its highest at the start of term in September 2000 (52.8%), with more than one message being posted for every two mailing list members. The posting ratio gradually dropped off throughout the rest of the year (see Figure 5.17)

Figure 5.17: Information Systems Group Posting Ratio
5.16.2 Yahoo! Higher Still Computing Group

The number of messages posted to the mailing list was very high soon after the start of term in September 2000 before dropping off sharply in October 2000. There was a gradual rise in the number of messages between October 2000 and January 2001 before another dip in messages in February 2001. The number of messages posted to the mailing list reached a peak of 97 in March 2001, just before the Easter holidays (see Figure 5.18).

Figure 5.18: Monthly Messages in the Higher Still Computing Group

As with the Information Systems group, the posting ratio was at its peak soon after the start of term in September 2000 (54%), with more than one message being posted for every two mailing list members. Thereafter, the posting ratio laid predominately between 10% and 30% (see Figure 5.19).
Unlike the communication tools on the STORM site, there is evidence of discussion between community members within the two Yahoo! Groups. It appears that teachers may be using the STORM modules as a resource for their professional development, while the Yahoo! Groups are acting as the main communication medium for the teachers.

5.17 Summary

The case study analysis in this chapter has shown that STORM has the vast majority of the tools required for building a successful Web community. However, a few modifications are required in order to make the sight more appealing to community members. Due to the delays in putting module content on the site, the volume of site traffic has failed to reach expected levels. As extra material goes online, site traffic should continue to increase.

STORM members have failed to embrace the communication tools on the site, with the bulletin board, e-mail and chat facilities all under-utilised. This may be due to the fact that there was already a thriving community of teachers in place within the Yahoo! Groups prior to the launch of STORM. The amount of time taken to put content on the STORM site may also be another contributory factor, as may the lack of involvement from
moderators on STORM. The content of the modules on STORM is being used to aid the teachers' professional development, while the Yahoo! Groups appear to be used as the primary communication medium where the teachers can discuss teaching methods and other matter relating to their day-to-day work.
Chapter 6: Conclusions

6.1 Conclusions

This dissertation has examined the key issues involved in constructing an online community, aimed at delivering continuing professional development. The use of Web technology is enabling professional development opportunities to be delivered to a wider audience than is possible by using more traditional means, especially under circumstances where community members are more geographically dispersed.

In order for a Web community to be successful, it must be built upon solid foundations. The community members must have a shared purpose and be willing to openly share information between themselves. Successful communities tap into a collective community-enabled purpose. They grow and thrive when members are able to fulfil their purpose and accomplish those goals that require other members to participate in the community.

This study has identified certain key tools that are important in developing a successful and thriving Web community. These are as follows:

- Backstory
- Site Map
- Feedback Loops
- Member Database System
- Frequently Asked Questions Database
- Communication Technology (e-mail, bulletin boards, mailing lists and chat rooms)
- Moderators/hosts

It is vital to give careful consideration to the tools used to develop any Web community especially since different Web technologies are suited to various needs and requirements. It is not sufficient to merely have the tools for community building. Whatever tools are used, they must match the requirements and needs of the community members. The
greater the relevance of the tools and the content of the community, the more likely they are to be used more often and deliver continuing professional development to the community.

Continuing professional development is an ongoing process and the use of web technology to aid this process is not a one-shot event. Web technology enables professional development to be a constant continuing process. However, Web technology is no panacea for professional development. The use of any technology must be linked to the goals and objectives of any professional development programme, and most importantly, must deliver real value to the community.

When implementing any Web technology, it is important not to lose sight of the goals of the community. The chosen Web technology must deliver continuing professional development to the community.

### 6.2 Areas for Further Research

Given the evolving application of Web technology in aiding continuing professional development, there are opportunities for further research in this area. Future research could expand the scope and scale of this study, conducting a wider number of case studies across a broader timescale, and involving a wider range of professional groups.

Future studies could also focus on the drivers of professional development, examining the motivation of people to take part in professional communities. As Web technology advances and develops, the potential for further benefits in approaching continuing professional development could also be developed.
References


Corporate University Xchange (1999), [http://corpu.com](http://corpu.com)


Institute for Learning and Teaching in Higher Education (ILT) (2001), http://www.ilt.ac.uk


Scottish Teachers Online Resource Materials (STORM) (2001), [http://storm.cs.strath.ac.uk](http://storm.cs.strath.ac.uk)


Yahoo! Groups (2001), http://groups.yahoo.com
Appendix A: SQA Higher Computing and Information Systems Courses

Both the Higher Computing and Higher Information Systems courses comprise two mandatory units and one optional unit each.

<table>
<thead>
<tr>
<th>Courses</th>
<th>Higher Computing</th>
<th>Higher Information Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mandatory Units</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Systems</td>
<td>Computer Systems</td>
<td>Database Systems</td>
</tr>
<tr>
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<td>Information Organisation</td>
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<td><strong>Optional Units</strong></td>
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<td>Artificial Intell</td>
<td>Expert Systems</td>
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<td>Computer Application Soft</td>
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<td></td>
</tr>
<tr>
<td>Multimedia Technology</td>
<td>Multimedia Tech</td>
<td>Hypermedia</td>
</tr>
</tbody>
</table>

- The STORM modules on Networking and Multimedia are both optional units within Higher Computing.
- The STORM module on Databases is a mandatory unit within Higher Information Systems.
Appendix B: Standard STORM Registration Letter

Dear [Name],

Thank you for the interest in the STORM project. We have accepted your application and have assigned you the following username and password:

Username  

Password

Please note that the site makes extensive use of the Macromedia Flash plug-in, which is now standard with most common Web browsers. On entering the site for the first time, please follow the 'Getting Started' link from the STORM homepage (http://storm.cs.strath.ac.uk). The 'Getting Started' page contains a collection of useful information on the layout and presentation of the teaching and learning material.

At present the site contains the full Database unit. In its entirety, this unit contains eight sub-units and provides the equivalent content of one full day of in-service training. The support infrastructure that comprises bulletin boards, chat rooms and a frequently asked question database is operational and is now being supported.

The Networking module is currently under construction. The first two sub-units are now available, and further material will follow shortly.

It is intended that a unit on Multimedia will follow in succession.

Wishing you all success with your online studies.

Yours sincerely,

The STORM Team
Appendix C: ‘STORM Alert’ Sent to all Members in March 2001

From: "STORM Team" <stormfaq@cs.strath.ac.uk>
Subject: STORM Alert

The Networking materials of the Scottish Teachers' Online Resource Modules (STORM) are now well underway. The first unit of this module is now available online in addition to the existing Database materials. In this STORM Alert, we would also like to draw your attention to three other features of the STORM system.

(1) STORM bulletin boards
Remember that the bulletin boards on STORM provide a *closed environment* within which registered users can discuss STORM and related teaching matters. The STORM developers are especially keen to have feedback and discussion related to STORM and welcome comments through the bulletin board facility.

(2) Data exchange service
We are investigating the feasibility of providing a STORM upload service. This would enable registered users to exchange teaching-related materials through the protected STORM environment. This service would be subject to the STORM conditions of use, but promises a valuable service for Scottish educators. Further information on this facility will be released soon. In the meantime, do let us know your feelings on the desirability of this feature.

(3) Lost or forgotten password?
If you experience problems logging in or have forgotten your username or password, contact StormFAQ (stormfaq@cs.strath.ac.uk) by email, or use the mail link on the STORM introduction page (http://storm.cs.strath.ac.uk/home.html). Be sure to let us have details of your name and institutional address.
Appendix D: STORM Member Analysis as at 1st July 2001

Total registered members 444
Active members 290
Registered members that have never logged in to STORM 154
Unique members accessing the bulletin board 128
Unique members posting to bulletin board 9
Total messages posted to bulletin board 14

- Active members are all registered members to have accessed the STORM site prior to 1st July 2001.
- Only 65.32% of the total number of registered users has ever accessed the STORM site.

Analysis of Active Members

<table>
<thead>
<tr>
<th>Month</th>
<th>Newly Active Members</th>
<th>Total Active Members</th>
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<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Jun 00</td>
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<td>77</td>
</tr>
<tr>
<td>Jul 00</td>
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<td>88</td>
</tr>
<tr>
<td>Aug 00</td>
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<tr>
<td>Oct 00</td>
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<td>Jun 01</td>
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<td>290</td>
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</table>
## Appendix E: Monthly Visitors to the STORM Site

<table>
<thead>
<tr>
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<th>Total Sessions</th>
<th>Active Members</th>
<th>Penetration Ratio</th>
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<td>15.52%</td>
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- **Unique Visitors** measures the number of different registered members to have visited the STORM site in any given month.
- **Total Sessions** measures the number of separate sessions in any given month; i.e. the total number of times that members have logged in to the site in the period of a month.
- **Penetration Ratio** is a measure of unique visitors to total active members.
## Appendix F: Monthly Analysis of Hits to the Main Areas of STORM

<table>
<thead>
<tr>
<th>Month</th>
<th>Search</th>
<th>Site Map</th>
<th>Chat Room</th>
<th>Bulletin Board</th>
<th>E-mail</th>
<th>Help</th>
<th>Tools</th>
<th>Networking</th>
<th>Multimedia</th>
<th>Databases</th>
<th>Register</th>
<th>Getting Started</th>
<th>Links</th>
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<th>Introduction</th>
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<th>Name of Group</th>
<th>Main Topic</th>
<th>Description</th>
<th>Launch Date</th>
<th>Members as at 1-7-01</th>
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<tbody>
<tr>
<td>Information Systems</td>
<td>Information Systems Courses (all levels)</td>
<td>This group aims to support and promote the teaching of Information Systems within Scottish schools and colleges. This group is designed as a forum for teachers and other interested parties to provide peer-to-peer assistance and exchange views.</td>
<td>03/01/99</td>
<td>457</td>
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<tr>
<td>Higher Still Computing</td>
<td>Computing Courses (all levels)</td>
<td>A discussion forum for teachers of Higher Still Computing in Scottish Schools.</td>
<td>14/02/00</td>
<td>371</td>
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<tr>
<td>SQA Computing</td>
<td>General Computing/IS/IT issues.</td>
<td>This group is now an announcement-only list but was originally designed to support Computing teachers and lecturers in Scottish schools and colleges who deliver SQA qualifications at any level and any stage ranging from Access level to Advanced Diploma. This Group has no official ties to the SQA.</td>
<td>17/03/00</td>
<td>374</td>
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<tr>
<td>Information systems-ah</td>
<td>Advanced Higher Information Systems</td>
<td>This group is for exchanges of ideas and tasks and discussions of how to teach the Advanced Higher Information Systems course.</td>
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<tr>
<td>Computing-ah</td>
<td>Advanced Higher Computing</td>
<td>This group aims to offer peer support for those offering Advanced Higher Computing within Scottish Education.</td>
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Appendix H: Mentions of STORM Within Yahoo! Groups

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<td>Mar-01</td>
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<td>11</td>
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<tr>
<td>Apr-01</td>
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- There was no mention of STORM in any other months, or in any other Yahoo! Groups.
Appendix I: Yahoo! Information Systems Group Monthly Analysis

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<th>Month</th>
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## Appendix J: Yahoo! Higher Still Computing Group Monthly Analysis

<table>
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