Creating A Virtual Face-To-Face Delivery Environment

*Michael Verhaart, Dr Kinshuk**
Eastern Institute of Technology, Hawke's Bay, New Zealand
Massey University, New Zealand

ABSTRACT

One particular challenge that educators face in a technologically maturing environment is the use of the technology to assist in delivering material in a way that maintains the benefits of face-to face (f2f) teaching while leveraging the advantages of the electronic delivery media. The ability to create an interactive experience encompassing not only the delivery but also the interaction is possible using web based technologies.

The paper discusses the advantages of face to face and on-line delivery systems and then discusses an innovative on-line prototype delivery model.

Keywords

Face-to-face, on-line learning, blended learning, learning objects

INTRODUCTION

Over the last 20 years one of the authors has developed and trialed many alternative face-to-face content delivery techniques. The continuum began with the manual methods of working with a blackboard (chalk), through early duplication (Gestetna and methylated spirits), then to whiteboards and overhead transparencies. This was followed by the desk top publishing era and included photocopiers and Word Processors (Wordstar, Word Perfect, Word), and finally to electronic delivery in the last 5 years. These have included Powerpoint, Windows Help Files and finally to Web based technologies, static HTML and now interactive web pages using ASP.

From a pedagogical perspective the goal has remained the same: to deliver content in a way that caters for a variety of learning styles and supplements face-to-face delivery.

What is meant by face-to-face? In a recent communication in the IFETS discussion list, Alfred Bork (2003) stated:

"The term F2F does not reflect the reality of current classes, except in rare cases. It might be better called 'face to sea of faces.' Where is the intimate contact in such environments? The numbers of students asleep during lectures shows how boring this approach is. There is nothing personal about lectures, and they cannot adapt to the needs of each individual student. And if a teacher touches a student, he or she will probably be facing legal problems."

Ania Lian (2000) discussed face-to-face delivery as follows:

> "However, if the concern with the *enriching* function of our learning environments were to be taken up seriously, on a second look it seems that the decision for abandoning Face-to-Face teaching is not based on the principle of critical assessment of its potentially enriching capacities. Rather, it is based in a logic which prioritises specific channels of contact (like on-line learning) over Face-to-Face modes which are considered redundant in the learning opportunities that they make possible. In other words, the strategy of abandoning Face-to-Face teaching is a strategy which deprives learners from access to learning channels only on the assumption that other channels can do the job just as well."

And later stated

> "Thus if Face-to-Face teaching is considered redundant in its form, it may not be the form that is redundant but the way in which this channel is *utilised by teachers*."… A complete learning environment begins now to look more like a mix between the *teaching strategies* based in a critical inquiry and the *teaching conditions* which are thought to support the goals which these strategies hope to achieve."

In this paper the authors will use face-to-face to include both "face-to-sea of faces" as in a lecture, and tutorial face-to-face, as in the case of delivering practical instruction with significant one-to-one involvement as students work through exercises of develop models.

In the introduction to the paper "Academic Identities and Blended Teaching Practices", Kim McShane (2003) states "Academics who are experienced in live, on-campus teaching usually make their first foray into online teaching by blending face-to-face and on-line learning." As an academic in a face-to-face teaching institution it has been an important research focus to develop tools that will assist in this environment by trying to combine the best of face-to-face with online methods.

LEARNING TAXONOMY

Before considering how technology can assist in face-to-face delivery, it is important to consider pedagogical issues. There are many theories that have been proposed that attempt to classify and categorize learning styles and processes. For example, Bloom's taxonomy is used as a basis that allows different levels of learning to be discussed. A brief summary is listed on the University of Victoria Web site (http://www.coun.uvic.ca/learn/program/hndouts/bloom.html). The learning levels are as follows: knowledge, comprehension, application, analysis, synthesis and evaluation. These levels are loosely tied to the level of study a student is at. For example a first year undergraduate level student would typically deal with knowledge, comprehension and some application, through to a post-graduate student dealing with synthesis and evaluation.

There are many other theories that need to be considered, such as Bruner's Constructivist Theory, Roger's Experiential Learning and so forth.

SEVEN PRINCIPLES OF GOOD PRACTICE

Not only does consideration need to be given to the different student learning styles, but also to the things that would be considered good practice in teaching delivery. Chickering and Ehrmann (1996) analyzed good practice in undergraduate education and developed seven principles. In summary, good practice:

1. Encourages contacts between students and faculty;
2. Develops reciprocity and cooperation among students;
3. Uses active learning techniques;
4. Gives prompt feedback;
5. Emphasizes time on task;
6. Communicates high expectations; and
7. Respects diverse talents and ways of learning.

CREATING A VIRTUAL FACE-TO-FACE ENVIRONMENT

The challenge then is to design an environment that blends face-to-face with on-line technologies, taking into account multiple learning styles and incorporates a delivery framework such as that of the seven principles mentioned above.

Starting at the first level of Bloom's taxonomy students need to achieve knowledge and comprehension. So a mechanism is needed that will deliver content. Typically in a lecture delivery mode there are two parts, handouts and the presentation, and any electronic content management system needs to be able to deliver both. Most commercial products tend to deal with one or the other and few try to deliver both.
If we move to the application level, this is often achieved via demonstrations, worked examples, or work-books. The Macromedia web site (http://www.macromedia.com) for example, contains many on-line tutorials that help train users in their products. Analysis, synthesis and evaluation occur at a much higher level, often requiring collaboration and interaction, and in an on-line setting are often catered for via bulletin boards, list servers, discussion groups and more recently wikis. Unfortunately there are several drawbacks with these methods. In a discussion list, for example, it is not uncommon for multiple threads to be running, and following each becomes increasingly difficult as the number of threads increases. So an important additional consideration is that the knowledge needs to be kept in context.

Creating common and reusable content is a goal of many educators and content developers, and there is much work currently in progress to develop sharable Learning Objects, for example CETIS (http://www.cetis.ac.uk/).

BENEFITS OF FACE-TO-FACE TEACHING THAT CAN BE SIMULATED IN A VIRTUAL CLASSROOM

Before discussing a content management system, it is important to look at some face-to-face benefits that could be simulated in virtual classroom. The following discussion will use the seven principles of good practice as a framework to organize the benefits in a structured way.

Good practice encourages contacts between students and faculty

In a face-to-face situation this can vary greatly. The "face-to-sea of faces" generally discourages this contact as the logistics of one lecturer responding to the needs of the individual students is not possible. Email and discussion boards can assist in this, but a major drawback is that context can easily be lost. For example, multiple threads can be interwoven in discussion lists. A more efficient solution would be to tie the discussion to the content. With smaller groups the interaction between students and faculty improves. In the authors' experience a group of about 14 – 20 students is manageable.

Good practice develops reciprocity and cooperation among students

Why do students attend face to face delivery? In many cases similar courses are available on-line. Anecdotal evidence suggests the social importance should not be underestimated. In spite of a technologically competent society, especially if we consider most of the students considering tertiary education show a level of technical competence, why do they attend face-to-face classes? Many Universities conduct on-line courses but have blocks of time allocated for face-to-face delivery. Having been involved in this delivery mode as a student, the actual on-campus component remains an important motivation.

Good practice uses active learning techniques

Face-to-face delivery should be active learning, but unfortunately this is not always the case. It is the authors' view that physically delivering content requires the skills of an actor, and indeed is a performance that is required to motivate the students. The word passion is often associated with teaching excellence.

A common delivery technique is to demonstrate a feature or technique in a lecture situation, and the students either emulate the technique or are required to apply the technique to similar situations. In an on-line context delivery can be done via video techniques, such as described by Chen and Huang (2002).

Good practice gives prompt feedback

This is where face-to-face delivery excels. If a student asks a question, an instructor can – most often – give an immediate response, and from visual clues work out whether further explanation is required. Unfortunately, in large classes the feedback loop is often neglected as the content needs to be delivered in a specific time interval.

Good practice emphasizes time on task

Face-to-face is very time constrained, although there are many institutions exploring flexible delivery modes where, for example, students can start and finish in a time of their choosing.

Good practice communicates high expectations

This will mostly be implicit, rather than explicit. That is, the quality of both the students and lecturers/facilitator comments will convey the expectation level. For example, in a public chat group the quality of the interaction is often trivial

and contains little if any structure or meaning, whereas a moderated discussion forum, such as the IFETS discussion list, can produce a high level of discussion. This has a parallel in face-to-face delivery, where students will react to poor delivery or inspired delivery, often by level of attendance. Experience also shows that if the lecturer expects high standards and has high standards in personal work then students will very often emulate this.

Good practice respects diverse talents and ways of learning

Generally face-to-face suffers in this area as delivery tends to follow a particular path and is often aligned to the techniques that the content deliverer is most comfortable with. A significant amount of research is taking place into how on-line delivery can adapt to differing learning requirements.

BLENDED APPROACHES TO CONTENT DELIVERY

Although online delivery is becoming a mainstream medium of instruction, face-to-face is still considered as an important discriminating factor and competitive advantage over pure on-line delivery. But the use of technology such as Blackboard is increasingly becoming popular. Hence, the motivation to continue development of a blended approach to delivery is important. The authors have moved from attempting to "integrate everything" to "using the appropriate tools to fit the relevant task". Therefore, at present Learning Management Systems are being used to provide any course related material such as copies of handouts (time schedules, prescriptions, and assessment specifications), and email is used for student communication.

THE SNIPLET PROTOTYPE SOLUTION

In order to address the above issues, a prototype content management system has been designed to assist in face-to-face delivery.

If a lecture is considered, there are two basic requirements: the first is the content to be delivered (may be a text book or personal notes) and the second the presentation (often PowerPoint or similar). Having two separate sources for content and delivery creates update problems particularly where the content is lecturer sourced and is very time inefficient. Thus, the ability to link the content with the presentation was an important consideration in developing the content management system. After several prototypes the concept of a sniplet emerged. Verhaart (2003) describes the sniplet development in detail. After several

prototypes, the content fragment that proved to be most workable was **a piece of knowledge or information that could be represented by one overhead transparency,** and in order to provide a way to refer to this, the term "Sniplet" was coined.

Figure 1 illustrates the sniplet model as displayed in an authoring and presentation role. The diagram shows how some of the presentation and content issues in this blended environment were implemented.

The ability to handle student handouts as well as lecture delivery was achieved by creating a sniplet record with a text field for both notes and overheads. In order to keep data entry simple, the notes are entered in as ASCII text, with a coded system to identify basic formatting such as bullets (Line starts with *) or numbers (line starts with +). Text can be entered in using standard html tags if features such as bold, are desired.

A sniplet is not an isolated learning object, and as such requires a taxonomy to provide context. At present a "backbone taxonomy" (Guarino and Welty, 2002) manages the ordering and linking of the sniplets, and operates in a similar fashion to a book index. This is shown in the top left window of figure 1. This taxonomy is more easily understood when displayed in frames although in the system a non-frames version is available, and depending on the hyperlink chosen, will display the description for notes or summary for overhead (if the summary is missing the description is displayed). When a student selects the overhead view (shown bottom middle with black background), this text is formatted via a style sheet to display in a form suitable for an overhead. Style sheets are student selectable and can be used to cater for student's preferences towards colour and font size.

One issue that has been resolved in the database sniplet version is that of printing lecture notes. In previous version of content management system, students were required to select each page in turn and print out separate pages. This was both a time consuming exercise and created a lot of pages often with very little content. The right hand frame in figure 1 shows the sniplets linked together to form a continuous page suitable for printing.

Once the core functionality was established the advantages of database technology was investigated. Text is not the only medium used to deliver teaching material though it has many advantages over other media, and in many cases it contributes significantly to the presentation in a multimedia rich environment. Standard HTML caters for a multimedia rich environment by linking to external media elements. The current prototype uses a reference table

that stores basic data about each multimedia element, such as a description that was used to automatically generating the alt tag in the viewable html page. This can then be attached to the sniplet. Further research is underway in this area to generalize more fully the attributes of the multimedia elements using common metadata schemas such as the Dublin Core, and the Resource Definition Framework (RDF). This is tentatively being referred to as MVML (Media Vocabulary Markup Language).

As lectures are often constructed from many sources, referencing correctly those resources is important. A reference entity (table) was created in which the fields could be entered and attached to a template that would construct the required referencing style. When required by a sniplet, the unique identifier for the bibliographic entry was attached.

As a result of this approach reverse linking became possible, where if all the bibliographic entries were displayed the associated sniplets could also be displayed. This is illustrated in figure 2.

Using the database approach also allows for an important extension to what is effectively a collection of static html pages, the ability to have users add annotations to the database. This feature is progressively becoming more common on the internet, with user feedback solicited in a variety of ways. For example, web sites of digital cameras ask users to rate their camera and provide a summary of their experiences, for example, http://www.dpreview.com/reviews/compare_post.asp. Research using the sniplet database then focused on capturing knowledge that the students have. It is the authors' belief that this is the core feature where face-to-face blends online delivery.

At present many systems allow the user to interact with the lecturer via email or bulletin boards. One major drawback of these approaches is that the discussion can quickly lose context. In a discussion list, for example, it is not uncommon for many threads to be happening simultaneously and each thread to be interlaced. Hence, the sniplet management system allows annotations to be added directly to the sniplet. Figure 3 is an enlarged version of the overhead view shown in Figure 1. It illustrates annotations entered by a student and reply from the teacher to indicate that the sniplet now reflects the changes suggested.

PRELIMINARY FINDINGS

The prototype has been in use for three semesters, and is continually evolving. Student surveys have been attempted but unfortunately the quantity of results

has been disappointing, so most of the feedback from the students is still at the anecdotal stage and from informal discussion.

The feedback generally relates to the actual use of the prototype by the students. Two courses were trialed in the second semester 2003. In the first, an internet and web design class, a nominal value was placed on the students for adding an annotation. This was done, firstly to encourage the use of the material and second to get the students used to finding the on-line theory notes. The second course, on database management systems provided the practical notes (MS-Access) and the theory notes (overhead projector type slides that complemented a set text).

While students were using the system, usage statistics were gathered. From a tutoring role quantitative data can be used to determine which areas of content are referred to most often or least often and depending on the feedback, it can evolve accordingly. Some example analysis is shown in figure 4.

Also the statistics can provide a useful profile of the learners. Discussion on the IFETS list server (http://ifets.ieee.org/) often returns to the topic of "lurking", with participants trying to quantify the usage and relevance. Tracking usage by learner can therefore potentially identify the lurkers.

SNIPLET CONTENT MANAGEMENT SYSTEM EVALUATION

How does the Sniplet Content Management System match the "Seven principles of good practice" mentioned in section 3? The following list has some initial observations from actual usage.

- Good practice encourages contacts between students and faculty
    - As a discussion point is raised it can be replied to by the instructor or another student.
    - Social Interaction can occur. This is preserved in the blended environment. The face-to-face component is vital in any student focused learning, otherwise all students would be learning on-line!
- Good practice develops reciprocity and cooperation among students
    - While the system could allow for discussion, in practice the system was not used to facilitate discussion.
    - With more and more students now using laptops in a classroom, there is a need to consider the integration of this technology with the content being delivered. Couple this with wireless technology

and a unique blend on traditional and on-line communication becomes possible. For a short while, students were given access to the main campus network via a wireless connection. During a lecture, one student indicated an update to the content and an annotation was suggested. The student had already added the annotation. This raises the possibility of the "shy" student interacting in a face-to-face environment.

- Good practice uses active learning techniques
    - The ability to annotate at the sniplet level keeps all discussion threads in context.
    - Figure 2 shows a fragment of the bibliographic entries. These entries are attached to a sniplet so that if a particular reference is reused in multiple sniplets, the associated sniplets may be accessed from the reference. This is also possible for Multimedia elements such as sound, video, and so on.
    - Therefore there are many alternative related routes available. Hyperlinks can be made, e.g. annotations can be done that hyperlink to the web. A media or bibliographic element can have links to other sniplets using the same media element.
- Good practice gives prompt feedback
    - As the system allows students to annotate content in a contextual way, feedback can be quick and relevant. Familiarity with the on-line system is a governing factor at present in the use of the system.
    - Face-to-face can give immediate feedback, but this is difficult when the class size is too large or the students do not feel comfortable requesting feedback. In this case the addition of the on-line option supports a second feedback channel.
- Good practice emphasizes time on task
    - This is not part of the content management system and is managed by the due dates and regulations within each of the programs.
- Good practice communicates high expectations.
    - Using modern technologies to deliver and maintain content encourages students to develop skills in these technologies. Indeed, students are requesting courses that cover web database technology as they understand the relevance to their domain.
- Good practice respects diverse talents and ways of learning.
    - Blended learning gives the greatest chance that the diverse range of learning styles can be catered for.
    - Students learn in a variety of ways: verbally, visually, textually and so forth. The ability to include a variety of multimedia elements is therefore critical.

- Instruction can be modified to suit the learning style of the students and situation. The ability to include multiple media elements goes some way to satisfying the criteria. Research is currently underway to first look at creating a manifest for each media element. For example, a blind person may set up their system so that all graphics are replaced with audio equivalents.

CONCLUSION

Despite the limited written feedback, anecdotal feedback from students is positive and provides motivation to continue evolving the content management system. A different approach to soliciting feedback may need to be investigated in this regard.

Where to in the future? The prototype is currently undergoing a major metamorphosis. It is being redesigned along two current frameworks, the Resource Definition Framework (RDF) from W3C and Metadata frameworks including Learning Objects from SCORM, IMS and others. Developing the MVML meta-data language model for the attached resources is a current priority. The understanding of the technologies involved is taking longer that anticipated, and the evolving Sniplet model is more ambitious than its predecessor.

REFERENCES

Bloom's Taxonomy (2003). Retrieved December 18, 2003, from http://www.coun.uvic.ca/learn/program/hndouts/bloom.html

Bork, A. (2003, October 9) Re: [IFETS-DISCUSS]. Message posted to http://ifets.ieee.org/. Retrieved January 12, 2004 from https://mail.fit.fraunhofer.de/pipermail/ifets/2003q4/000252.html

CETIS, the Center for Educational Technology Interoperability Standards (http://www.cetis.ac.uk/)

Chen, N.S and Huang S.Y. (2002), Applying Evolutionary Prototyping Model in Developing Stream-based Lecturing Systems. Retrieved January 12, 2004 from ifets.ieee.org/periodical/6_4/19.pdf

Chickering, A. and Ehrmann, S. (1996), "Implementing the Seven Principles: Technology as Lever," AAHE Bulletin, October, pp. 3-6. Retrieved December 10, 2003, from http://www.tltgroup.org/programs/seven.html

Digital Cameras Comparison Results (2004), Digital Photography Review. Retrieved January 21, 2004 from http://www.dpreview.com/reviews/compare_post.asp

Guarino,N and Welty, C. (2002) Evaluating Ontological Decisions with OntoClean. Communications of the ACM, 45, 2. pp. 61-65.

IFETS Forum website (http://ifets.ieee.org/)

Lian, Ania (2000), Knowledge transfer and technology in education: toward a complete learning environment. Retrieved December 3, 2003, from: http://ifets.ieee.org/periodical/vol_3_2000/lian.html

Macromedia web site (http://www.macromedia.com)

McShane, K. (2003) Academic Identities and Blended Teaching Practices. Retrieved December 3, 2003, from http://surveys.canterbury.ac.nz/herdsa03/pdfsnon/N1127.pdf

Verhaart, M. (2003). Developing a knowledge capture system based on sharable and self documenting learning objects. Educational Technology & Society, 6(3), 1-16, Retrieved December 3, 2003 from: http://ifets.ieee.org/periodical/6_3/1.html (ISSN 1436-4522)

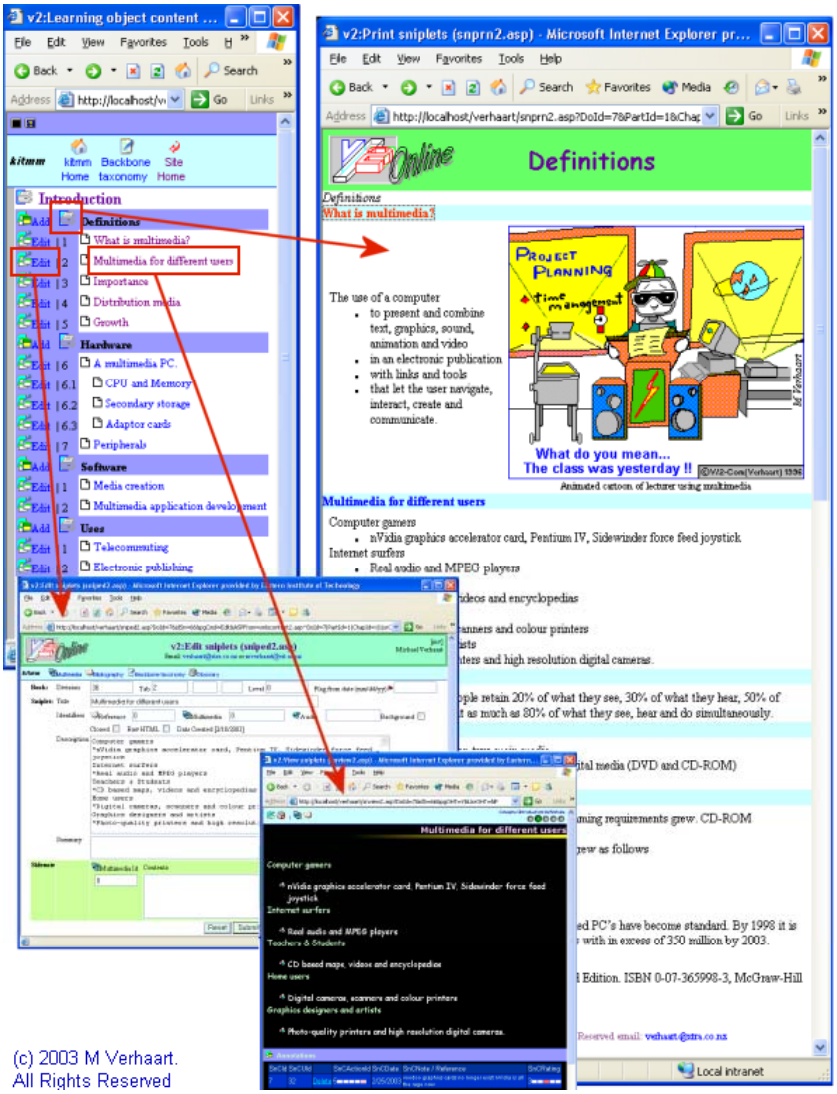

Figure 1: Sniplet Model in authoring mode

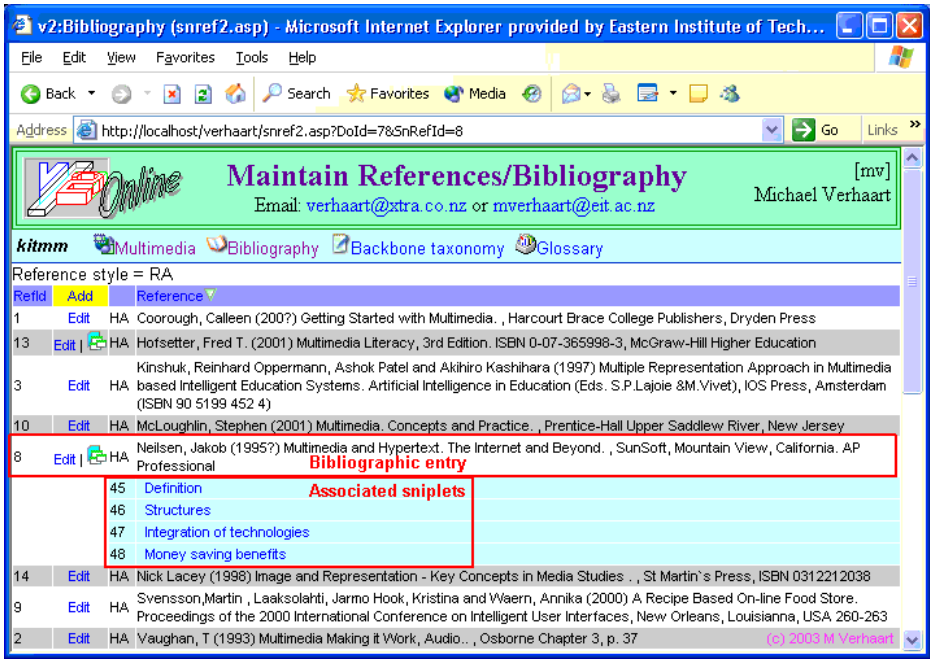

Figure 2: Bibliographic list showing a bibliographic entry with associated sniplets

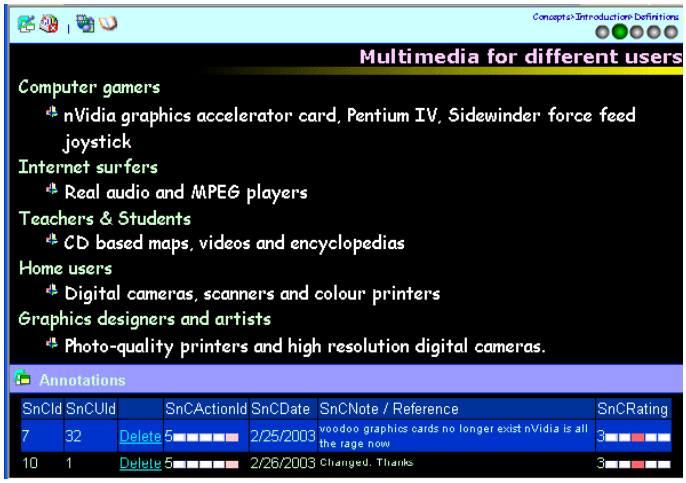

Figure 3: Overhead view of the sniplet

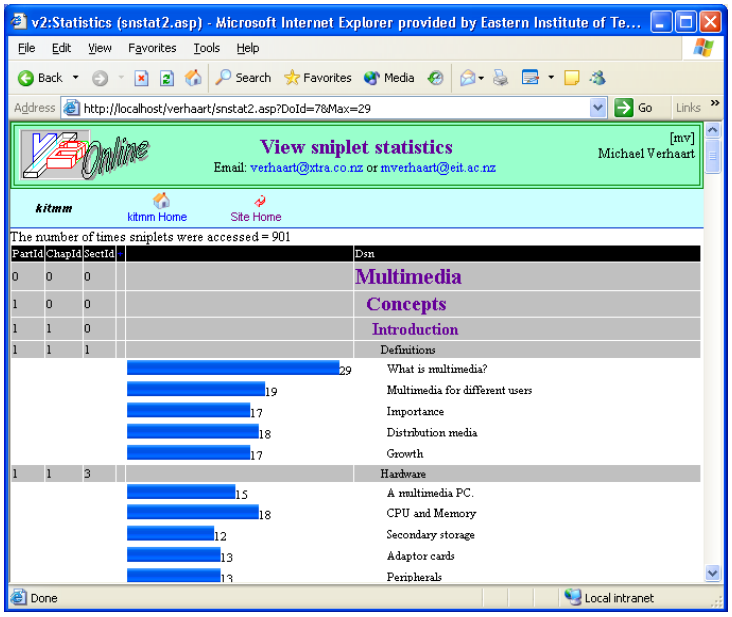

Figure 4: Graph showing number of times each sniplet was accessed