

Creative ways of managing student Internet download quota to facilitate learning

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In the current climate of financial constraints and with the increasing use of technology in teaching, many tertiary institutions are finding it necessary to review their policies and procedures in relation to student access to learning resources via the Internet. Universities are encouraging use of the Internet as a method of flexible delivery of learning materials but Internet usage has resource implications.

This paper examines options for managing Internet usage that facilitate flexible teaching and learning. These options have been developed by the collaborative efforts of an academic, an educational designer, a librarian and computing professionals. A number of guiding principles relating to managing student Internet download quota that are based on sound pedagogy are suggested. These principles relate to appropriate usage of the Internet by students and the varying needs of different student groups.

In writing this paper, different methods of managing student Internet access by universities around Australia were surveyed. A number of options were examined including the use of a throttle proxy; a caching proxy; a student quota system; and a method of ensuring free access to required resources, applying a quota only for independent research. The options for possible policy changes were also considered. From this, a number of recommendations for further action were developed.

Introduction

Universities are encouraging use of the Internet as a method of flexible delivery of learning materials but Internet usage has resource implications. In the current climate of financial constraints and with the increasing use of technology in teaching, many tertiary institutions are finding it necessary to review their policies and procedures in relation to student access to learning resources via the Internet.

Background

The advances in communication technologies in recent years have provided the opportunity to change the way teaching and learning occurs in universities, particularly in the way learning environments are constructed and computers are used to access information via the Internet (James, 1999). Such developments pose challenges not only for educators in terms of using the technology in ways grounded in pedagogy but also for administrators responsible for ensuring the limited financial resources allocated to supporting computer assisted learning are used in a timely and effective way.

At the University of Western Australia (UWA), the Faculties of Economics & Commerce, Education and Law (ECEL) recognise the need to put in place the infrastructure to support and encourage the use of the Internet in teaching and research (ECEL Strategic Plan, 1998). The vast resources of information accessible via computer technology and the Internet are being utilised by lecturers preparing learning materials and are increasingly being incorporated in their teaching. Students are also using the Internet in their learning and research.

Investigating the notion of download quotas and the establishment of appropriate guidelines brings with it a need to distinguish between what constitutes required or essential information for educational purposes that is relevant to the student's course of study, and additional information that is desirable for their university program. The DETYA Guidelines indicate that students must not be charged for accessing information that is required as part of their course but may be charged for additional materials which are not essential. How the distinctions about information are made, who makes them and the quantity that constitutes a 'reasonable amount' of Internet download are some of the issues addressed in this paper.

Current practices

Current practices ECEL

All ECEL student and staff generated web traffic is logged by the proxy server. These logs are scanned on-the-fly by the 'traffic monitoring system'. This allows all Internet activity to be watched as it happens, as well as keep a running total of how many bytes have been downloaded by each user. Proxy servers are usually associated with a 'cache' that holds a copy of incoming objects (e.g., web pages, images, sounds etc). The ECEL Computing Services (ECS) server however does not cache traffic because it is not powerful enough, and because ECS have only been required to monitor traffic. The ECS proxy server in turn accesses the Internet via the University Computer Service (UCS) campus wide cached proxy server. This server acts as a cache for University traffic. How long objects remain in the cache depends on the volume of traffic.

Each ECEL student is allocated an Internet quota of 28Mb/week. Information downloaded from Australian academic sites (i.e., those whose addresses include 'edu.au') is not counted in the user's Internet usage. Students are not restricted to this quota, however, any excessive downloads are billable at a rate of \$3/Mb. This amount was calculated as twice the rate of the most expensive ISP at the time, with the purpose of discouraging recreational and excessive browsing.

Since moving from a daily to a weekly quota in June 2000, approximately four students a week have exceeded their quota. This is a significant reduction on the numbers of students who exceeded the daily quota. ECS practice is only to bill students for the excess after they have received warnings, unless the amount of excess is considerable. Few students, however, exceed their quota by a large amount.

One problem facing ECS now is that, with the 'larger' amount of quota available since the introduction of a weekly quota, students are downloading games, movie trailers and other non-coursework-related material. ECS has had to issue reminders that only coursework-related web browsing is permitted.

Currently there is no method of assessing if an object is retrieved locally from the UCS cache or whether it is retrieved from elsewhere (Australia or overseas). For this reason it is assumed by ECS for the purpose of Internet quotas that all incoming traffic is not cached. Only by developing an ECS caching proxy would it be possible for ECS staff to differentiate between these types of traffic.

Current practices nationally: Analysis of responses to a national survey

In November 2000, a national electronic survey (see Appendix A) was conducted involving 38 tertiary institutions. Responses were received from 20 universities. A summary of the findings follows.

In response to the question “Does your institution have an Internet quota” more than half (12 out of 20) indicated they did not have a quota system. However, of these 12 universities, five replied that they were looking at introducing quotas next year and a further two indicated they were currently reviewing their management strategy in this regard. In most institutions, regardless of whether they had a quota system or not, the amount of Internet traffic was controlled by the proxy server and cache. The provision for students to buy capacity outside the choke existed in some cases. Of the remaining eight institutions that had student Internet quotas, in all but one instance, the policy for quotas was administered at an institutional level.

The way in which the quota was expressed varied between institutions, ranging from two or three Mb/day (with a weekly or fortnightly capping system), to a unit system and to a fixed cost such as \$10 per annum. Where there was a quota, most institutions offered free access to essential course material, to education and government sites, and to any sites AARNet does not charge for.

In response to the question about variation between student groups, the indications were that quotas generally applied to undergraduate students, with postgraduates being treated either as staff or having to pay for access from their research budgets. Of the eight institutions that had quotas, half distinguished between part-time and full-time enrolments and the other four did not take this variable into account. The results of the survey also revealed that where a student exceeded their quota the option was usually available to purchase additional quota. Only one institution indicated access was denied once the limit was reached. All but two of the institutions with a quota system monitored the sites being accessed. Monitoring was usually done on a random basis. In one instance, the proxy had been set to ban certain sites (e.g., porn sites).

Options

There are a number of options for managing student Internet usage. These include the following:

1. Throttle proxy

A throttled proxy is a proxy server that limits the bandwidth, thus limiting the amount of traffic that can be downloaded via it. The throttle acts by speeding up or slowing down the connection speed, thus limiting the amount of traffic that can be downloaded. It does this by judging how fast the daily (or hourly etc) traffic is accumulating, and adjusting the bandwidth accordingly so that the limit will not be passed. If there is little traffic being generated, then the bandwidth will be high. If there is high traffic, then the bandwidth (and thus the speed) will be lowered by the proxy. The throttle can be set to a certain amount, for example 1000Mb in a day, so that the ‘highest possible’ cost can be known in advance. This is useful for budgeting purposes.

This option is not recommended because of the low speed at times of high demand, leading to frustration on the part of users. This option would be likely to discourage student Internet use.

2. *Use of a caching proxy to reduce costs on the student quota*

Establishing a caching proxy would allow universities to not charge if an item is already in the cache. The first time an item is downloaded (from edu.au and overseas) it would be charged against student quota. The item would then be in the cache and other students would access it from there (providing the document had not been changed on the original server). This could be advantageous when lecturers refer to a document on a server.

There are however, a number of reasons why this option would not be recommend. Firstly, the sort of sites lecturers are referring their students to would need to be analysed. Some sites have advertisements on that are deliberately changed frequently so that the page is 'updated' and so the page in the cache becomes obsolete. Secondly, the copyright implications of this practice are not yet clear. Thirdly, the practice imposes a penalty upon the first student to download the material.

3. *Quota limit and payment of excess*

The policy in relation to quota limit and payment of excess should cater for students who exceed their amount. That is, students should not be denied access in these circumstances but should be advised in advance that the excess amount will incur a fee.

4. *Vary quota limit according to enrolment status*

The system of Internet download quotas adopted should take into account the individual needs of the students based upon their enrolment status (e.g., part-time/full-time, undergraduate/postgraduate).

5. *Free access to recommended reading, but an extra quota for exploration*

Electronic reserve

Eight of the institutions had an electronic reserve system for full text and URLs. In all cases this system was managed by the Library. ????
Carol I need your help with the electronic reserve section.

It may be possible to develop systems whereby no quota applied for access to URLs in the Library Reserve that academics have designated as recommended reading. Students would then be given a small personal quota to use for independent study and research. This idea parallels current practice in regard to hard copy materials where, for example, recommended readings are generally placed in the Library Reserve and students can borrow or photocopy them. At the end of each semester URLs in Reserve and the check database of URLs would be removed and returned to the lecturer.

This system is already partially in place in some universities. However, although students are not charged for usage of these URLs in the library, they are charged if they access these sites through the computer laboratories or remote access. Currently, if lecturers recommend a web site to students for access then this URL can be placed in the Library Reserve system in the same way that print photocopies and books are. If lecturers were encouraged to do this, it will provide students with a free "one stop shop" for required reading. It would be possible for ECS to also be notified (either by the

lecturer or by the Subject Library). ECS could then link the proxy cache to a check database of these URLs so that these 'recommended reading' URLs are not charged against student download quotas when accessed from outside the library for example in student computing labs.

The Working Party considers that such a system has a number of advantages: academic staff have control over what the appropriate content for their unit, all students have free access for their course-related material so that download quotas would only be necessary for independent study and research; and the system has no copyright infringement implications.

6. *No quota*

Having no download quota gives students unlimited access to the Internet. Apart from the obvious potential cost implications, an unlimited Internet usage policy would potentially encourage irresponsible and non-discriminatory use of the WWW.

7. *An electronic reserve of full text documents*

To create a full text electronic reserve, a lecturer would lodge a full copy of the digital item in an 'electronic reserve' database. Access is local and so would not count against the student download quota.

The issues raised by this option relate to copyright. All the resources of the Internet are protected by copyright. Under the *Copyright Act 1968*, most universities have an agreement that enables staff to make available copies of digital material for educational purposes (i.e., teaching) provided certain limitations are observed.

At this stage, the creation of a full text electronic reserve is not recommended for the following reasons:

Firstly, only 10% of a digital work can be copied without permission of the copyright owner. The AVCC is still negotiating with CAL on how 10% is to be measured for the digital medium and there is no agreement on how use will be measured. For all other cases copyright permission **MUST** be sought from the owner of the site.

Obtaining copyright clearance, however, is time consuming. Although a number of Australian Universities have established electronic reserve projects (Council of Australian Libraries, 2000), obtaining copyright clearance has been difficult. Monash University Library report that out of 1,235 requests for copyright clearance sent, 489 approved the request with no fee, 53 approved and charged a fee, 45 requests were denied and 648 did not respond (Groenewegen, Hedger and Radulescu, 1997). An electronic reserve project in the UK, Project Heron estimates that copyright clearance will take 6-8 weeks (Henty, 2000). This type of return on copyright clearance with this sort of lead-time would not be compatible with the current academic practices at many universities. However, as more universities move towards online teaching practices, it is expected more academics will use this option.

A final problem is that copies of works made available on a university website or closed reserve should be secured by way of a password restricting access to those students enrolled in that particular course. At UWA the Library currently has no authentication system in place for electronic reserve, however, they are currently investigating authentication as a project in the University Library's 2000 Operational Plan.

Guiding principles

The following principles are suggested to guide the determination of student Internet quotas:

Principle 1: Current student download quota should be assessed to determine whether they are adequate, and, if not, they should be amended accordingly.

At UWA, student usage of the Internet is having a significant impact upon the technical support services of ECS and has potential resource implications. The change from daily to weekly quotas has provided more flexibility to download larger files, however, it is apparent that this is not, in many cases, adequate. Depending upon the particular course or year level, students may be required to download a considerable amount of material. Therefore, the first issue that needs to be determined by universities that have a quota system is what amount constitutes an adequate download.

As a means of estimating such a quota for students, we have identified two sets of competing tensions. We believe that it is necessary, in assessing an appropriate download quota, to strike a balance between:

- Student access to required or desirable material on the one hand and student access to the WWW as a resource for open or further research on the other; and
- Technical support and costs of student Internet usage on the one hand and encouragement of innovative web-based teaching and learning on the other.

Principle 2: An appropriate download quota should encourage students to use the Internet as a research resource.

The student download quota should not only be adequate for a particular student's ability to access relevant material recommended by lecturers, but should allow for use of the WWW for valid research purposes (James, 1999). It has been suggested that the most prominent public feature of the Internet is the multitude of possibilities it offers for information retrieval and this is considered to offer educational advantage. However, some concern has been expressed that the means by which this advantage is realised are typically not well specified (Greening, 1998). Furthermore, to encourage students to be independent and self-directed learners, they need to be provided with opportunities to explore the Internet to supplement the materials lecturers may recommend. In reference to access to the WWW, Curach and Fisher (1999) state "the foremost role of a teacher today should be to teach students how to learn. In that regard, there has probably never been a piece of technology more fittingly applicable to the constructionist philosophy of education". It is important, therefore, that a download quota be more than the minimum necessary for students to access material recommended in their units.

Principle 3: The download quota should take into account the students' varying needs according to enrolment status.

Download quotas should be determined on the basis of level of enrolment (e.g., undergraduate, postgraduate) and the number of units in which a student is studying.

Principle 4: The download quota should be estimated on the basis of appropriate usage of the Internet by lecturers for teaching and learning purposes.

Although most university education seeks to encourage students to be independent learners, students come to university with varying degrees of learning independence. Those students that are not independent learners, for instance, in the area of research, will not develop new learning strategies spontaneously: these must be taught and students require some guidance and support while learning these strategies (Kift and Airo-Farulla, 1995; Baron and Allen, 2000). Therefore, lecturers should take some responsibility in minimising student downloading where this course of action is possible and appropriate. The principles relating to traditional learning material should be extended to Internet usage:

- If material is essential to a course, then, as in the case of hard copy materials, students should have access to that material in an alternate form (e.g., electronic reserve);
- If material is non-essential, but highly recommended by the lecturer and likely to attract a significant amount of downloading, the material should be placed in the library or in an electronic reserve (with due regard, of course, to copyright);
- Students should be given some direction in their exploration of the Internet for specific teaching and learning purposes. That is, in a similar way that lecturers compile supplementary reading lists, they should be encouraged to provide learner guidance in regard to visiting relevant Internet sites.

Principle 5: Heads of Department and academic staff should be made more aware of the resource implications of downloading.

The increasing pressure for educators to incorporate new media into their courses and teaching practices brings with it a concomitant need to develop knowledge of, and skills in, the design and distribution of multimedia resources (Litchfield, 1998). It is therefore not surprising that through no fault of their own, many academic staff may be unaware of the policy relating to student download quotas and the associated costs. It is important that Heads of Department and lecturers are informed of these resource implications and their responsibilities in this regard.

Principle 6: The procedure for setting the download quota for individual units be sufficiently flexible to accommodate innovative use of the Internet in teaching and learning.

While it is necessary for lecturers to take some responsibility for minimising student download costs, it is important that innovations in teaching and learning are not stifled. This is particularly the case in the current tertiary learning environment where student demands for flexibility and relevance are coupled with government funding cuts and professional accountability (Freeman, 1998). Given these factors, there is a danger that in the rush for greater efficiency, the Internet could be used in an unthinking and an uncritical manner, rather than being used to enhance student learning. This recommendation also acknowledges that there are legitimate pedagogical grounds in some instances for the download quota to be increased (e.g., to undertake a comprehensive literature review, to satisfactorily complete an assignment). Academic content and design issues are the responsibility of the lecturer, who should have the ability to increase the download quota if such an increase would facilitate their learning objectives in a particular unit.

Summary of recommendations

The determination of an appropriate student Internet download quota policy may be guided by the following principles:

1. Any current student download quota should be assessed to determine whether it is adequate, and, if it is not, it should be amended accordingly.
2. An appropriate download quota should encourage students to use the Internet as a research resource.
3. The download quota should take into account the students' varying needs according to enrolment status.
4. The download quota should be estimated on the basis of appropriate usage of the Internet by lecturers for teaching and learning purposes.
5. Heads of Department and academic staff should be made more aware of the resource implications of downloading.
6. The procedure for setting the download quota for individual units be sufficiently flexible to accommodate innovative use of the Internet in teaching and learning.

In addition:

- The viability of requiring that the URLs of all required Internet readings be placed in the Library's Reserve should be investigated.
- If universities do choose to have a quota system, then it should be assigned on a per semester basis; and the amount of the quota should be allocated according to the course, year level and the number of units in which each student is enrolled.
- The download quota and the cost of purchasing additional download quota should be determined by the relevant IT body within the university and monitored thereafter on an annual basis.
- Provision should be made for lecturers to vary the default quota where the educational design of their units justifies such variation on the basis of sound pedagogy.
- In regard to the creation of an Electronic Reserve of the full text of essential and/or recommended readings, librarians should monitor the situation in regard to the Copyright Amendment (Digital Agenda) Bill. If the copyright situation becomes more flexible for academic institutions and enables downloading of full text documents to a local server, it may be possible to create a full text document reserve in collaboration with the library. This may be appropriate when the precise version of a document is important.

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Sally Kift and Geoffrey Airo-Farulla, 'Throwing Students in the Deep End, or Teaching Them How to Swim? Developing 'offices' as a technique of law teaching', (1995) 6(1) *Leg Ed Rev*, 56;

A Litchfield, 'Designing Educational media: learner centred processes', in 'EdTech'98: education and technology: planning for progress, partnership and profit: conference proceedings: the biennial conference of the Australian Society for Educational Technology, Perth, WA, July 5-8 1998 edited by Clare McBeath and Roger Atkinson, pp 105-112. In our experience, the development of such knowledge and skills is, at this relatively early stage of the development of multimedia educational resources, uneven across university teaching staff.

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Appendix A

Student Internet download quota survey

We are investigating better ways of managing student internet download quota in our faculty. To assist us, would you please spend a few minutes to respond to the questions in this brief survey.

To select your response, double click on the box, under “default value” select “checked”, and click “ok”.

1. Does your institution have a student internet download quota? Yes No

If **no**, how does your institution manage student downloading?

- an ISP for dialup access Yes No
- other method _____

2. Do you have an electronic reserve system? Yes No

If **yes**,

a) What kind of information is available from this source?

- URLs Yes No
- full text Yes No
- other _____

b) Who manages the electronic reserve system?

- Library Yes No
- Other _____

If you **do not** have student internet download quotas at the institution where you are employed, then please ignore the remainder of the questions.

Don't forget to send your reply (please send as an email attachment).

If you **do have** a student internet download quota system at the institution where you are employed, then please respond to the questions below.

3. How is that quota expressed?

- Units (e.g., 1Mb = 7 units) Yes _____ No
- Megabytes (e.g., 30Mb/week) Yes _____ No
- Other _____

4. Which site categories do you allow students to have free access to?

- edu.au Yes No
- gov.au Yes No
- essential course related internet reading material Yes No
- other _____

5. Does the quota vary between year groups, or between undergraduates and postgraduates?

Yes No

If **yes**, please give details of the breakdown below:

1st year _____
2nd year _____
3rd year _____
Honours _____
Masters _____
PhD _____

6. Does the quota vary between full-time and part-time students? Yes No

7. Is this policy administered at:

- a departmental level, Yes No
- a faculty level, or Yes No
- an institutional level? Yes No

8. What happens when a student exceeds their quota?

- Access denied Yes No
- Option to purchase additional amount Yes No
 - If **yes**, cost of additional amount? _____
- Other _____

9. Is the material downloaded from the internet by students monitored at your institution?

Yes No

If **yes**, how regularly is it monitored?

- daily Yes No
- weekly Yes No
- monthly Yes No
- randomly Yes No

Thank you.