

# Improving student engagement through tracking student interactions with online materials

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## Abstract

Over the last two decades many Universities in Australia have moved to offer property programs in alternative study modes. The University of South Australia offers property in on-campus (internal) as well as off-campus (external) and off-shore (transnational) modes. Each mode uses a high level of online materials and interaction. The major difficulty with educating students off campus (where students do not have any on campus activities) is that of student engagement especially where it involves experiential teaching. It is difficult to engage students without face-to-face contact and it is also difficult to gauge how students interact with the material. One option is to track how and when student's access online materials, but this it is almost impossible in the absence of a specialised University system to allow this.

This paper illustrates how a free, web based system can be used to track online activity (for any html page on the world wide web) and presents some results of this tracking over a course that is offered in three different modes. This provides insights as to how students in different modes interact with the online materials and may give guidance as to how to better engage students online, in each mode.

**Key words:** Teaching, student engagement, online teaching, web tracking

## Introduction

This paper examines how tracking of online activity can assist teaching staff to engage with students by understanding students' web behaviour. The use of online teaching material has increased over the last two decades. Within Universities these have normally been used to enhance traditional teaching methods and assessment rather than moving to fully online delivery and assessment. This is the case at the University of South Australia (UniSA) where alternatives to traditional internal classes have been common since the early 1990's but most assessment is still in the form of assignments and exams with limited use of online testing. Where online materials are used to enhance teaching there are a number of levels that apply. In its most basic form the internet is used simple as a "faster post box" with tradition correspondence style education. In its most complex form, students work fully online for all student engagement and assessment. The system in UniSA is somewhat antiquated but this allows almost infinite variability for staff with good web based skills. However there is no tracking system available to academic staff. Put simply academic has no idea if students are interacting with the material at all! There is growing evidence that students in 2008 (primarily gen Y) have different attitudes to study and use different techniques. Readers of this paper who deliver undergraduate courses have probably significant anecdotal experience of this. In more traditional style education it is easier to see if students are interacting with the material: they are in class or on campus asking questions. With online teaching or where a mixed mode (including web supported internal classes) is used it is more difficult to see who is interacting and when.

For this study a student web was tracked using a publicly available system that can track any web that uses basic web pages such as .htm, .html and .asp pages. The results from this are matched with survey and observational information to assess how and when students interact with the online material in three different teaching modes. The aim is to better understand how students interact with the material and enable staff to design better courses based on the pattern of actual interaction. The broader aim is to produce better graduate outcomes through improved student engagement especially of experiential material.

## Background

The University of South Australia offers courses in a variety of modes usually with at least online support through its own online environment (UniSAnet) which enables full HTML coding. UniSA has not moved to a proprietary system such as BlackBoard or Moodle although this is anticipated to occur in 2009. Both of these systems have tracking systems to report on student use although surprisingly little research has been published using these. Since no tracking system is available in UniSAnet and IT staff can give only broad information about usage, it is difficult to see when students access materials, for how long they access it and which resources are used the most.

To overcome the lack of an inbuilt tracking system a free, web based system (Google Analytics) has been used to track online activity for this study, although this is not general practice at the University. This system is widely used to monitor web pages. Google Analytics helps the “owner” of a web to

“Learn more about where your visitors come from and how they interact with your site. You'll get the information you need to write better ads, strengthen your marketing initiatives, and create higher-converting websites. Learn more about the [benefits](#). Google Analytics is free to everyone, whether you are an advertiser, publisher, or site owner.” (<http://www.google.com/analytics/> - viewed 14-1-09).

To use the system the web owner adds a simple script to each HTML page and Google then collects data and sends it back to the server. The online Analytics site then provides various means of analysing the data. Analysis can drill down to page level or be more general. The user can set time periods, output etc .

## Methodology

For this preliminary study just one course from the Bachelor of Business (Property) is examined. This will be extended to two courses for a final paper.

Property Market Analysis (PMA) is a second year a second level quantitative methods course to develop students' ability to analyse property markets and use statistical modelling. The course leads to students developing, testing and using an Automated Valuation Model (AVM) at suburb level using current market transactions as well as working with property price indices and other time series economic indicators using basic econometrics.

This course is offered in three modes;

- Internal - 13 weeks of lecture and workshops, web support including podcasts of lectures and workshops but no printed materials
- External - fully online including podcasts from the internal lectures and workshops with no printed materials
- Offshore - 4, 3 hour blocks of lectures, 3, 3 hours tutorials, online support including podcasts and full printed material and CD.

This paper draws upon the outcomes from PMA study period 5 in 2008. This covers the entire period of the internal and external offered and the offshore after the initial classes. It should be noted that offshore offerings have printed and CD materials and therefore the online support is mainly through online forums.

The study uses a combination of the web tracking results, online and face to face surveys (conducted in the final teaching week), focus groups and interviews after the end of classes.

The study aims to address three research objectives:

- To discover how and when our students interact with the material and what leads to higher level of engagement. While it is accepted that web “hits” do not equal engagement it's certain that students cannot be engaging in material via the web that has not been hit!
- To discover how and when students use podcasts.
- To discover differences in the way that students in different modes of study use the materials.

## Results

### Web Tracking

The following results show a standard Google Analytics output for the PMA web page. Although raw data can be collected the online system produces a series of charts and tables with help with analysis and these will be used here. They are based on user logs but presented in this manner as basic analysis automatically from Google Analytics.

**Figure 1 - Analytics – Total visitors chart and statistics.**

**Jul 28, 2008 - Nov 28, 2008**

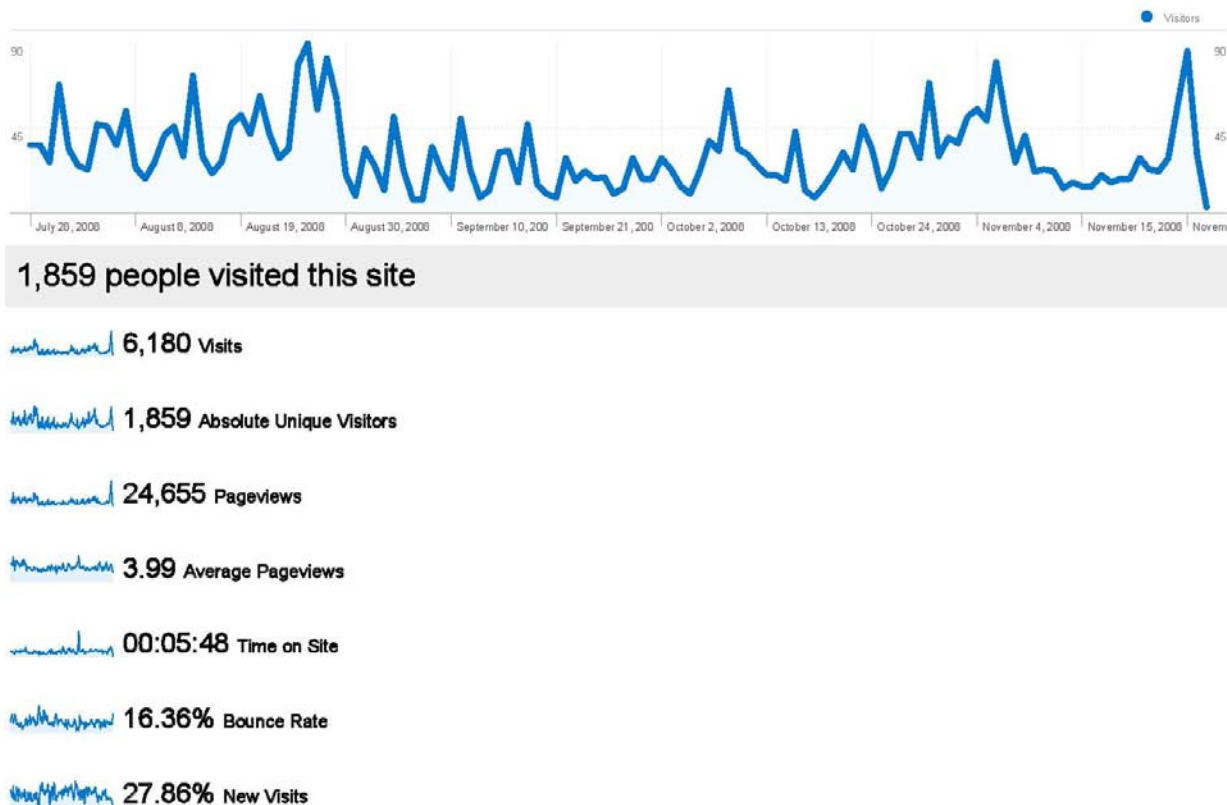


Figure 1 shows visits to the site from 28 July - 28 Nov, 2008. This includes the activity from the first day of the study period through to the day after the examination. The summary indicates 6,180 visits (from 111 students). In total there are nearly 25,000 pages views with users visiting almost exactly 4 pages on average per visit with an average of 5minutes 48 seconds on the site.

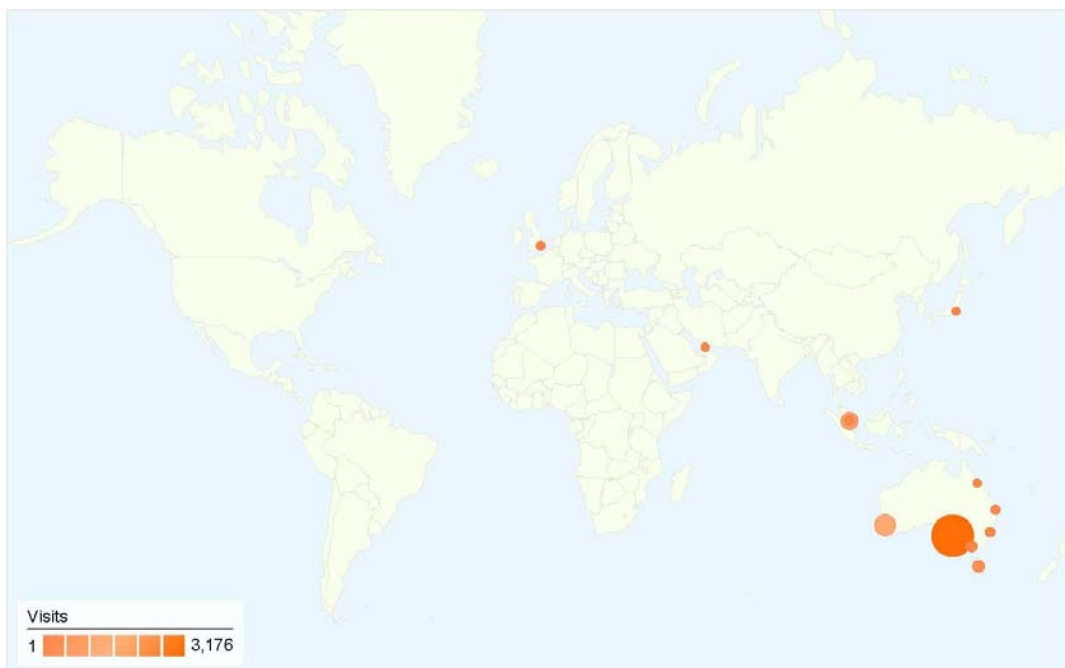
The page shows hits on HTML pages only but does not include time on items opens such as slides, podcasts, animations, excel pracs etc. Typically students will access the site download slides, podcasts, excel sheets etc and then use these in study. The time on site is therefore not a very useful indicator of overall student engagement. Note also that there are a large number of “unique” visitors. Unlike systems within the student access area (as would occur in Blackboard for Moodle) the activity is based on the users computer sending a log to a remote server via a script. These logs rely on the IP address of the computer accessing the site rather than a username. Every time a student uses a different computer they will appear as a unique visitor. This will particularly occur with internal students accessing the web from the student pools or barns. Each different computer will appear as a different user. Individual student activity cannot be assessed through this system however as the site is password-protected only students can access the site so use is from students enrolled in the course.

Visits to the site appear to have distinct peaks each week and what appears to be almost cyclic activity. This will be discussed later in the discussion.

**Figure 2 - Analytics - Web browser statistics**

Internet Explorer	5,215	84.39%	Unknown	3,280	53.07%
Firefox	711	11.50%	T1	1,939	31.38%
Safari	146	2.36%	Cable	418	6.76%
Chrome	106	1.72%	DSL	382	6.18%
Opera	2	0.03%	Dialup	137	2.22%

The browser used to access the web is shown in Figure 2. It indicates that 84% of students use internet explorer, which would account for all accesses from on campus. Firefox is also well used. Safari which is the default browser for most Mac computers and is also used on Mac portable devices such as the iPhone and used by some Windows users has very limited use as do alternative browsers such as chrome and opera.

**Figure 3 - Analytics – Spatial graphic of use**

Google analytics also shows the location of the user at the time the site was accessed. This is shown spatially in Figure 3 and as a table in Figure 4. This is particularly useful when dealing with external students. For this course the vast majority of hits was from Adelaide which would include internal “on campus” students. There were also considerable hits from locations where external and offshore students were located including Singapore, London and most major cities in Australia. A small number (not shown on the table) of hits are shown for locations where students have returned home for family reasons (Japan and the Middle East) indicating that students remain engaged even when they need to urgently return home – a significant advantage of offering courses with full online support.

**Figure 4 - Analytics - Table showing number of visits from cities**

City	Visits	Pages/Visit	Avg. Time on Site	% New Visits	Bounce Rate
Adelaide	3,176	4.32	00:06:02	25.98%	11.81%
Perth	1,187	4.05	00:05:53	59.31%	10.70%
Singapore	824	2.77	00:04:08	9.34%	42.84%
Hobart	342	4.55	00:07:30	15.50%	10.82%
Melbourne	232	3.60	00:06:44	9.48%	15.52%
Sydney	139	3.94	00:05:24	4.32%	14.39%
Brisbane	83	3.48	00:04:56	30.12%	14.46%
(not set)	72	3.17	00:07:12	8.33%	30.56%
London	55	2.95	00:02:56	3.64%	18.18%
Woodlands	28	2.82	00:05:43	10.71%	39.29%

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Google Analytics

Figure 5 indicates the number of hits on specific pages (only the highest hit pages are indicated). The welcome pages is opened when internal or external students first arrive at the site. Only students in Singapore can arrive through other means. However the 6,071 hits on the welcome page shows that most of the 6,180 visits were through the “front door”. From this point students can access a range of general materials:

Lecture –Study notes	3098 page views	111 students	27.9 per student
Problem 1 (Assignment 1 resources )	1926 page views	111 students	17.4 per student
Problem 2 (Assignment 2 resources )	1485 page views	111 students	13.4 per student
Problem 3 (Assignment 3 resources )	1539 page views	111 students	13.9 per student
Excel Practicals	1405 page views	111 students	12.7 per student
Exam Advice	976 page views	111 students	8.8 per student
Lecture Audio recordings	500 page views	111 students	4.5 per student
Readings and resources	408 page views	111 students	3.7 per student

Or go to resources for individual groups of students starting with a notice board:

Internal students	1,730 page views	65 students	26.6 per student
External students	1,383 page views	18 students	76.8 per student
Offshore students (June 08 reference)	780 page views	28 students	27.9 per student

Noticeably the page hits for external students were over three times higher than for internal or offshore students. This is probably to access the noticeboard where at least two postings were made per week. For internal and offshore students the in-class time was used more for passing of this information.

Also on average each student hit the lecture-study notes page just over twice for each of the 13 weekly lectures and roughly once for each of the 12 weekly excel pracs. The problem pages which serve as an introduction and link to all resources relating to that problem (assignment) were hit very often.

Figure 5 - Analytics - Unique Page hits

Page	Pageviews	Unique Pageviews	Time on Page	Bounce Rate	% Exit	\$ Index
/Resources/101291/All students/welcome.htm	6,071	4,519	00:00:30	5.03%	6.72%	\$0.00
/Resources/101291/All students/Lecture-Study Notes/Notes.htm	3,098	1,543	00:02:23	36.94%	30.15%	\$0.00
/Resources/101291/All students/Problem 1/1 Overview.htm	1,926	926	00:02:17	36.00%	27.88%	\$0.00
/Resources/101291-i/Internal students/Noticeboard.htm	1,730	1,025	00:01:48	34.43%	26.53%	\$0.00
/Resources/101291/All students/Problem 3/1 Overview.htm	1,539	932	00:04:23	47.57%	41.20%	\$0.00
/Resources/101291/All students/Problem 2/1 Overview.htm	1,485	866	00:03:54	42.86%	35.62%	\$0.00
/Resources/101291/All students/Excel Practicals/Excel Practicals.htm	1,405	959	00:03:44	57.02%	36.44%	\$0.00
/Resources/101291-e/External students/Noticeboard.htm	1,383	908	00:03:12	43.26%	41.50%	\$0.00
/Resources/101291/All students/Exam Advice/Exam Advice.htm	976	495	00:04:04	56.36%	31.66%	\$0.00
/Resources/101291-propertyjune08/PMA ECON 2011 June 08/Course noticeboard.htm	780	716	00:01:40	38.06%	38.97%	\$0.00
/Resources/101291/All students/Problem Based Study Guide/Contents.htm	666	404	00:00:13	0.00%	3.00%	\$0.00
/Resources/101291/All students/Audio Recordings/Lecture recordings.htm	500	357	00:00:54	25.00%	16.20%	\$0.00
/Resources/101291/All students/Readings and Resources/Readings and Resources.htm	408	245	00:01:41	31.58%	19.12%	\$0.00
/Resources/101291-propertyjune08/PMA ECON 2011 June 08/Problem 3/2 The_Problem.htm	392	218	00:05:21	62.79%	48.98%	\$0.00

### Podcast Survey

The use of audio recording of session was researched as a part of this project. While audio recordings have always been used some new things were tried in 2008

- Both Lectures and workshops were recorded. Podcast were made available immediately after they were given for internal students and links to the audio files were put on the web pages (and access from the audio recordings and lecture study notes page).
- Some shorter weekly updates on assignments and direct comments were recorded for externals in addition to the lectures and workshops.
- Grabs of any whiteboard material was added to the pages after classes
- This process was partly to overcome the delay in roll out of Lectopia at UniSA
- Students survey at the end of the study period in class or online.

The results of the survey showed that most students liked the idea of having audio recordings of all sessions. The following results summaries the outcomes.

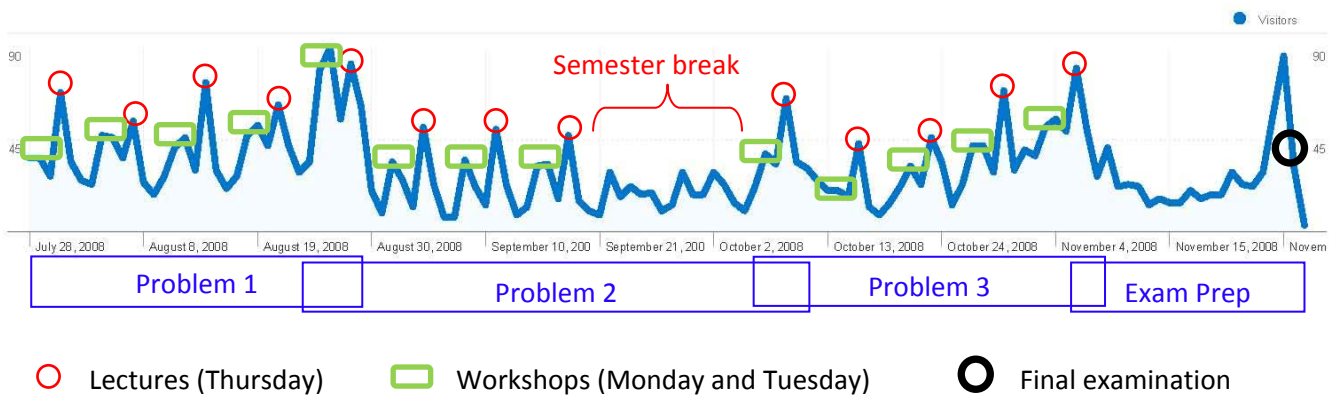
- All external students responding used Podcast and almost all listen to every podcast at least once
- Internal students almost always listened to the podcast if they missed a session

- Over 40% listened to them even if they attended a lecture or workshop on at least 2 occasions.
- Most students listened to more than 2 podcasts in preparation for the exam. Some revised every session!
- All feedback was positive including many that said that the format made the course unique amongst those they had studied.

### Discussion

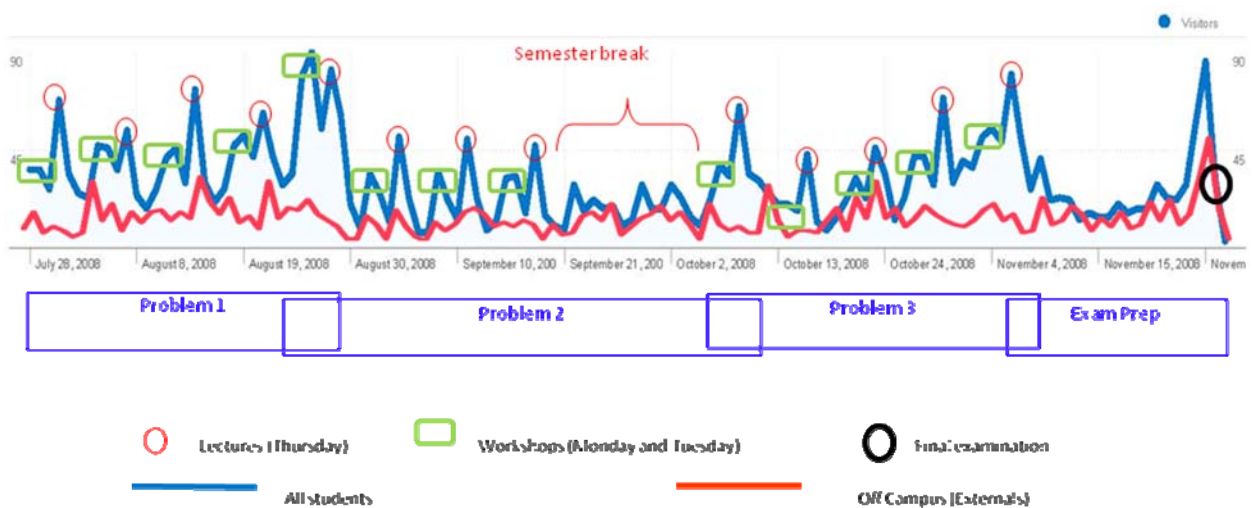
The basic analysis of results is useful, but they take on additional meaning when other activities are aligned to the number of page views. In Figure 6 the chart of web usage is overlaid with markers for various activities, in particular the dates of the lectures, workshops and exam and the period over which the three problems or assignments were undertaken.

Figure 6 - Analysis of daily web visits cross referenced to teaching and assessment activities



The chart is then broken down to reflect the access of the external students in Figure 7.

Figure 7- Analysis of daily web visits All Students and External Students only



From these graphics (and previous discussion) the follow conclusions were drawn.

- Internal students tended to access materials for the lecture only a few hours before the lecture even when they were available earlier. Those students that did use the podcasts accessed them either that week or during the revision period.
- External students tended to access information in “chunks” usually around 2 weeks at a time but many accessed on a weekly basis. Podcast were considered vital in order to give them the “in class” feel. While video would be preferable some students suggested they would rather the more personal and immediate nature of the podcasts to a more “staged” video. They podcasts helped then to structure their study. While being external meant that they could study when it was

convenient for them (if they were local) many found the use of combination of continuous problem based work, weekly podcasts of workshops and lectures with weekly posting to encourage them to study on a weekly basis and to structure the workload better.

- All students tended to access material multiple times. Access was high when new material such as the 4 week long problem based work was uploaded. Access then dropped on this material while the content was being covered in workshops and lectures but was strong before submission. Similarly Exam study materials were access early and then more significantly just before the exam.
- Internal students had minimal access during the mid-semester break but external students carried on as normal.

## Suggestions

- External students want to feel a part of the class and podcasts are the most useful for this as they are more organic- where possible the lecturer should include them in the commentary – even though they are not sitting in from to them at the time. As one student put it – “it felt like the lecturer was talking directly to me in the podcasts”
- Breaking down the assessment into smaller parts will force students to work more continuously, posting work weekly and involving them in workshop style work encourages this. While weekly submission may be too onerous submission around 3-4 weeks give externals the opportunity to work more continuously but still allows them a high degree of flexibility.
- External students want flexibility of access so that they can access the materials when they have blocks of time.

## Conclusions

In general the project confirms many personal expectations about the way modern students study. Internal students access information weekly in line with classes and access material on an ongoing basis. Podcasts of classes were accessed that week or during the revision period.

External students access information in “chunks” usually around 2 weeks. Podcasts are vital in order to give them the “in class” feel and this encourages better structured study but in their own time.

All students - tended to access material multiple times. Access was high when material was first added then become more steady but increased just before each assessment item was due.

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