The Loop Tool
User Guide

This document is part of the "Completing the Loop" Handbook, which can be downloaded from http://melbourne-cshe.unimelb.edu.au/completing-the-loop . Please cite as:

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Introduction

The Loop Tool was developed to integrate teachers' pedagogical intent, as articulated by their learning design, with students' learning processes, captured through learning analytics. Design principles were established to guide the development of a tool that combined knowledge from previous literature and existing tools with the findings from the interviews conducted during the first phase of this project. The resulting Loop Tool included two main elements: a Pedagogical Helper Tool and a Learning Analytics Tool. The Pedagogical Helper Tool enables teachers to articulate the connections between learning outcomes, learning design and learning technologies used. The output of the Pedagogical Helper Tool is a map to guide teachers when interpreting data from the Learning Analytics Tool. In turn, the Learning Analytics Tool presents visual representations of data from the learning management system, highlighting important aspects related to the learning design of each course.

Further information about the Loop Tool is available at the project website melbourne-cshe.unimelb.edu.au/completing-the-loop. The following sections present detail of the design principles that guided the development of the Loop Tool, including the pedagogical helper and learning analytics components.

Design Principles

Four influences informed the design of the Loop Tool. Firstly, Laurillard's conversational framework recognises that learning involves interaction. Translating this concept into an analytics design requires graduating from simple access counts to focus on analytics that provide more detailed information about student interactions with learning activities and resources. The second, and related, notion is that in order to understand the output of learning analytics there needs to be an understanding of the learning design that underpins the activities and tasks that students are engaging in online. Third, the Loop Tool is both fuelled and constrained by the functional affordances of the particular technology-based tools and LMS that teachers and students are using. This in turn determines what forms of data can be exported and visualised by the Loop Tool. Finally, findings from the interviews conducted during the extensive investigation phase of this project with university teachers across the participating institutions resulted in the Learning Analytics for Learning Design Conceptual Framework, which is presented in the project handbook.

Based on these main influencers, four design principles were created to guide the Loop Tool development. Table 1 presents each of these principles as well as their rationale, tensions to consider, and how they can be operationalised within the project to address these tensions.

Table 1. Design principles that guided the Loop Tool development.

Principle	Rationale	Tensions to consider	Operationalisation
Apply learning analytics to data from common LMSs	- Required by most universities in Australia - Teachers already use LMSs, mainly Moodle and Blackboard	- Moodle and Blackboard have limitations on what data is provided and when - Although Moodle and Blackboard are similar, they have some technical differences	- Develop a tool for both Moodle and Blackboard as similar as possible to each other
Learning analytics must be linked to learning design	- Teachers should acknowledge their learning design before accessing and interpreting analytics	- The terminology associated with technology-based tools may be more familiar to teachers than learning design terminology	- Have a learning design component of the tool that enables teachers to "acknowledge" or describe their pedagogical intent - Link the acknowledgement to a technology-based tool - Use the technology-based tool as a doorway to learning analytics
Accommodat e common teaching practices	- Diversity of ways to set up a LMS for the same learning design - Diversity of technology/tools used by teachers	- Some teachers have shown interest in getting basic learning analytics, without a clear connection to the learning design	- Allow basic access/use data to be returned to teacher - Also allow sophisticated activity-based data to be returned to teacher
Provide timely sets of learning analytics data to teachers	- Teachers want learning analytics for particular time periods	- Not clear what is an appropriate and feasible immediacy of learning analytics reports	- Allow a period of time to be specified by the end user

It was decided that the Loop Tool would (1) accommodate data from the two most commonly used learning management systems (LMS) in Australia: Moodle and Blackboard, (2) have two interconnected components: one focusing on learning design and one on presenting

learning analytics visualisations; (3) present both basic and more sophisticated learning analytics; and (4) allow data to be updated and displayed in a flexible way.

Overview

Once the Loop Tool has been implemented at an institution (see Installation Guide for technical details), the tool may be accessed through a server or URL (as determined by each institution). There are two levels of access for users in the Loop Tool: administrator and educator. The administrator can create new users, group users according to their permissions to facilitate user management, grant access for specific courses, create courses to use the Loop Tool, and create events for courses. Events are defined as key instructional activities that represent milestones for a course related to the learning design. There are three types of events in the Loop Tool: weekly repeating events (e.g., a lecture every Tuesday), single events across the semester (e.g., a field trip in week 4), and submission events (e.g., an online quiz that is available online from week 7 until week 9). Figure 2 presents a screenshot of the administrator homepage.

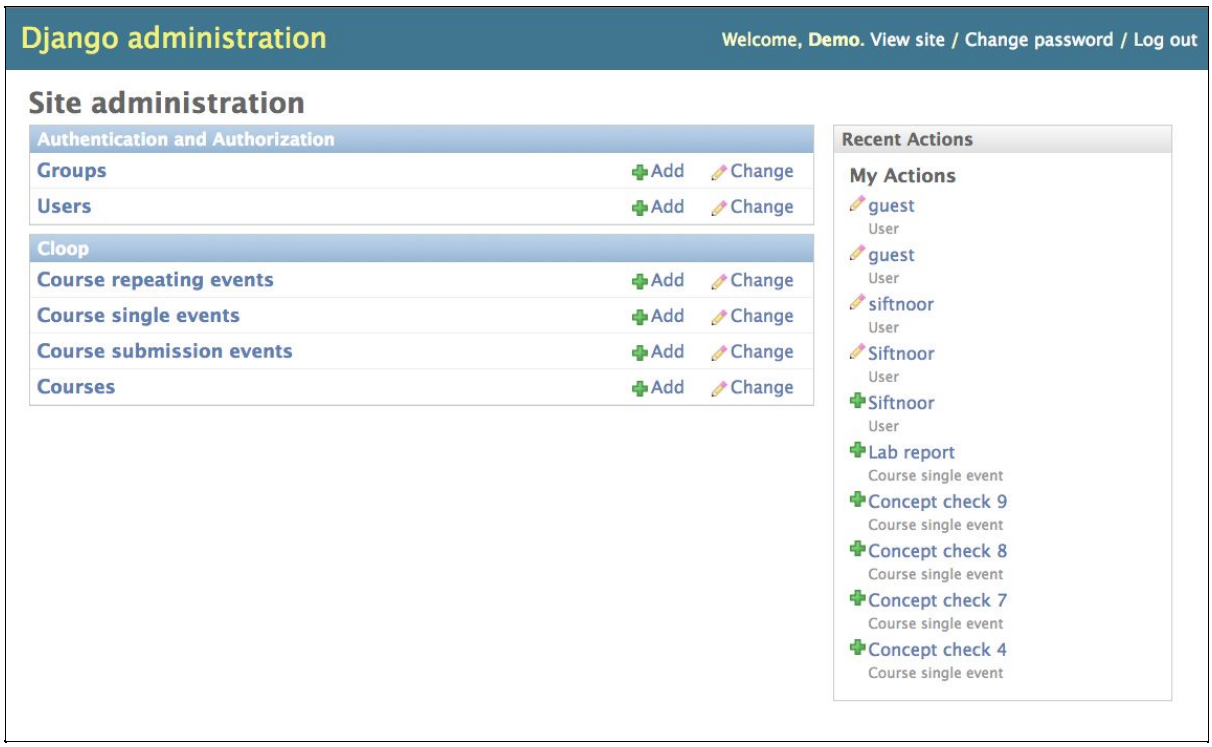


Figure 2. The administrator homepage

The educator profile allows teachers access to one or more courses. This gives users access to the Pedagogical Helper Tool and the Learning Analytics Tool for all courses they have permission to view. Figure 3 presents a screenshot of the educator homepage.

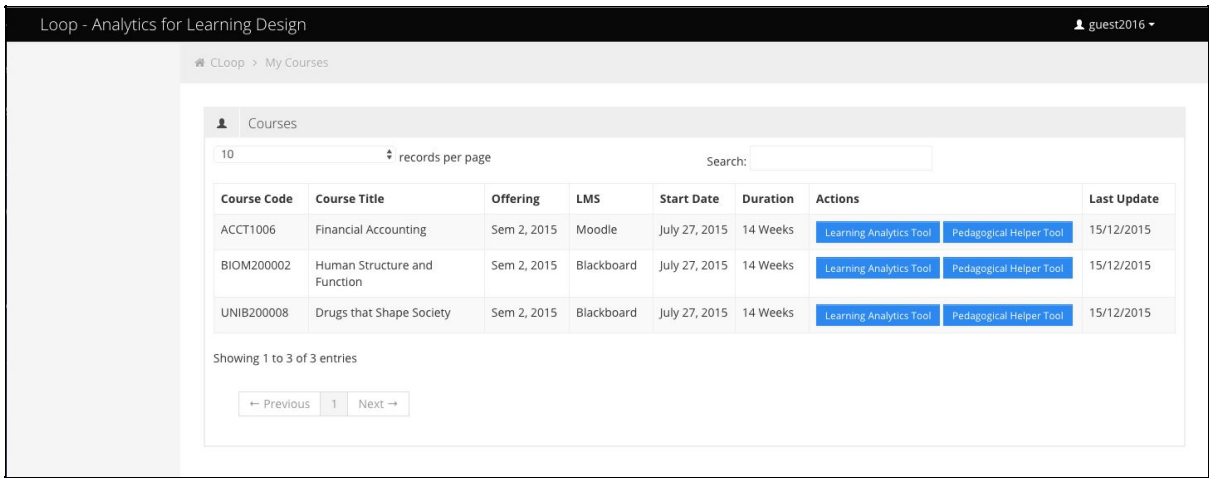


Figure 3. The educator homepage

The following sections provide an overview of the Pedagogical Helper and Learning Analytics components of the Loop Tool.

Pedagogical Helper Tool

The Pedagogical Helper Tool provides a space for teachers to articulate the association between the learning objectives, learning design and the technologies used in their course. The first step is to add the learning outcomes of the course. A teacher may add as many learning objectives as necessary.

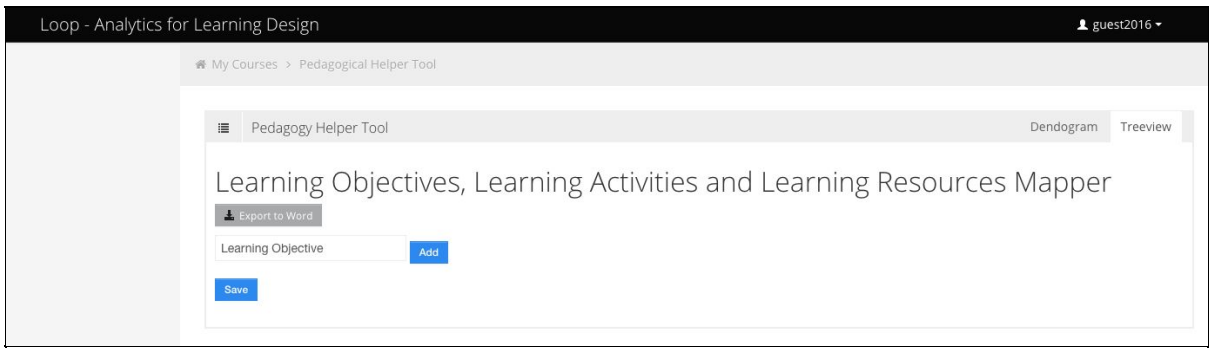


Figure 4. Adding a learning objective in the Pedagogical Helper Tool

For each learning objective the teacher can then add one or more learning activities designed to help students to achieve that objective (Figure 5). For example, a learning activity could include a pre-reading for a lecture or an online interactive module that the students are required to complete.

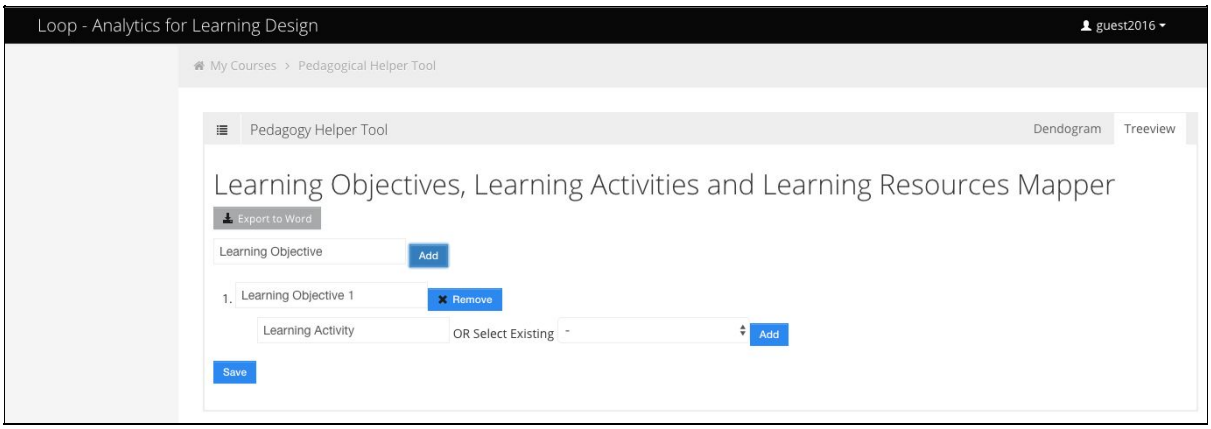


Figure 5. Adding a learning activity associated with a learning objective

Finally, for each learning activity one or more learning resources can be defined (Figure 6). If the learning resource is something that is available to students via the LMS, the teacher can select it from a list of LMS resources by clicking on the 'Course Structure' button. If the learning resource is not available on the LMS the teacher can enter a name for the resource in the text box so that it can still be represented on the learning design map.

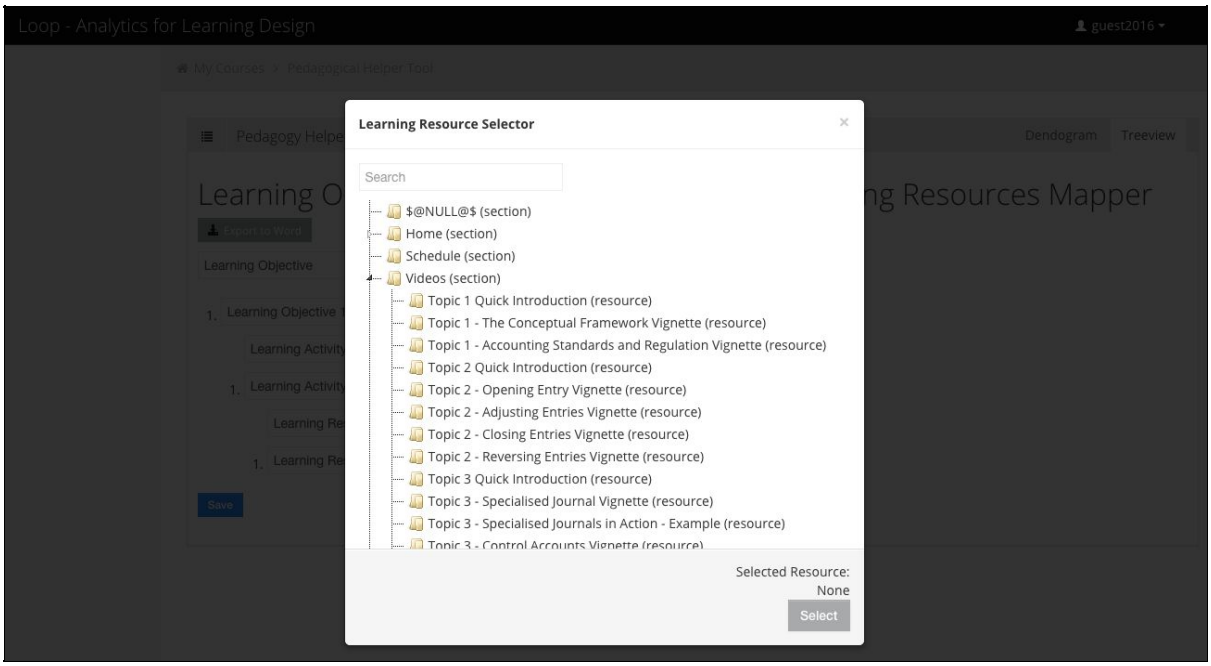


Figure 6. Adding learning resources to a learning activity

Once a learning activity or resource is added to the Pedagogical Helper Tool, it becomes available to be selected for other learning outcomes or learning activities. This allows a learning activity to be easily associated with two or more learning outcomes, and a learning resource to be associated with two or more learning activities.

The connections created between learning objectives, learning activities and learning resources can be exported as a table in a Microsoft Word document, as illustrated in Figure 7, or a dendrogram, as shown in Figure 8. These represent the main output of the

Pedagogical Helper Tool: a text/visual map linking learning design (represented by learning objectives and learning activities) with learning analytics (represented by the learning resources). This map can be used as a point of reference by teachers when exploring data in the Learning Analytics Tool.

Learning Objectives	Learning Activities	Learning Resources
1. Learning Objective 1		
	2. Learning Activity 1	
		456750. Case Study 2 (resource)
2. Learning Objective 2		
	2. Learning Activity 2	
		456710. Practice Set Resources (folder)

Figure 7. Word document output of the Pedagogical Helper Tool

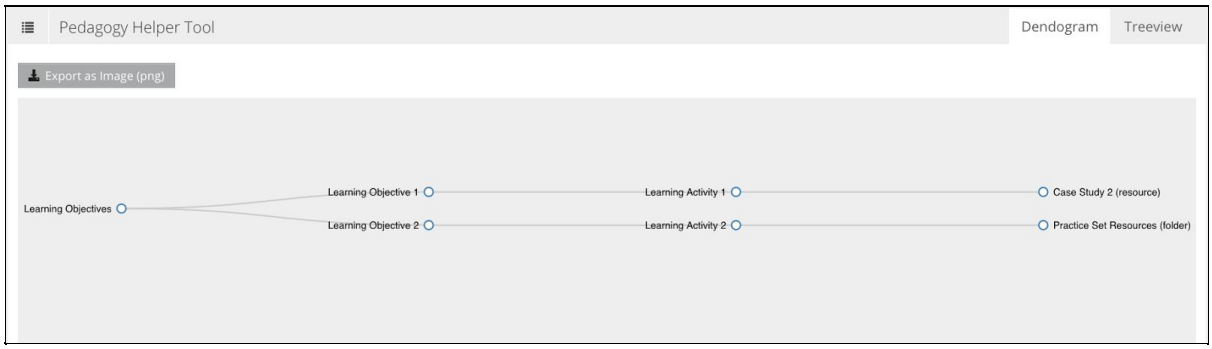


Figure 8. Dendrogram output of the Pedagogical Helper Tool

Learning Analytics Tool

The Learning Analytics Tool is designed to display LMS data to teachers in meaningful ways. There are three main sections that make up the Learning Analytics Tool: course dashboard, course access, and students. The course dashboard presents a summary of all students' interactions with the LMS over different weeks or an overall view of the whole course. The course access section presents access data for the content, communication and assessment resources in the LMS. The students section allows drilling down to specific students and exploration of their interactions with the LMS throughout the course. These sections are easily accessed from the Learning Analytics Tool menu on the left of the screen, as presented in Figure 9.

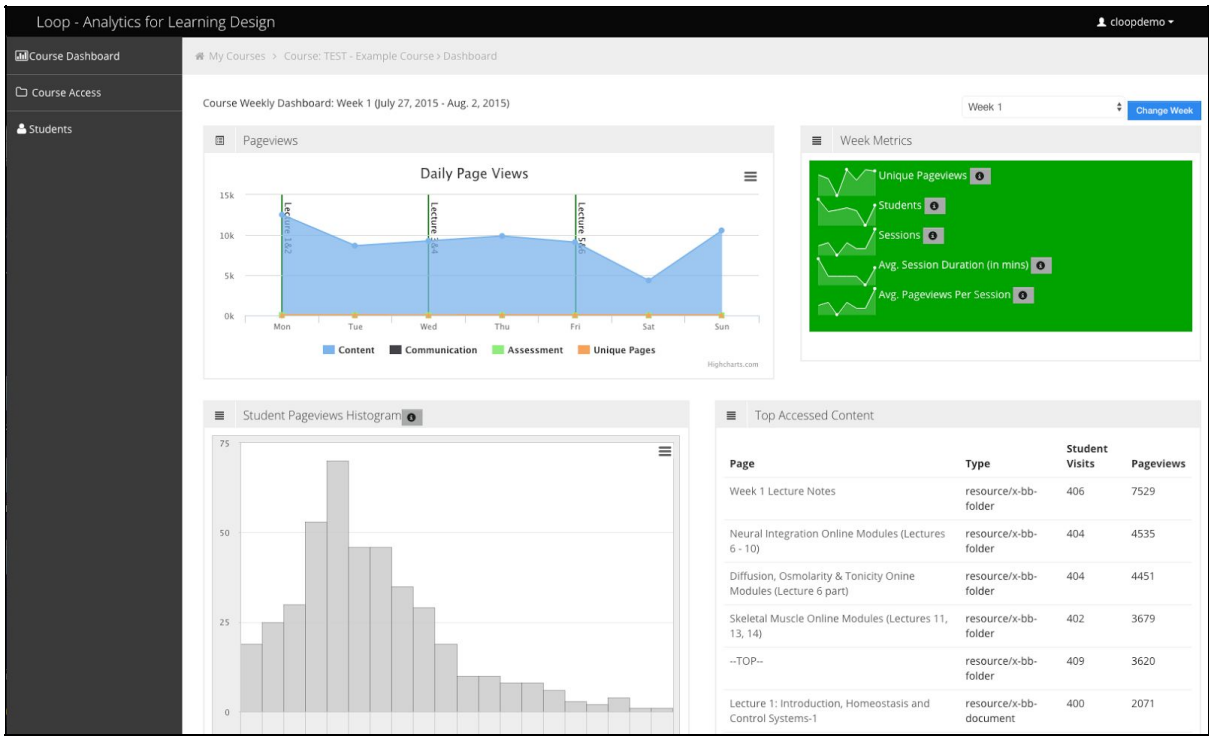


Figure 9. The Learning Analytics Tool dashboard (with menu items on the left-hand side)

Information buttons (represented by the letter “i”) are available throughout the Learning Analytics Tool to provide additional support. When hovered over, these buttons provide more detailed information about specific features of the tool.

Course Dashboard

The course dashboard gives an overview of students’ interaction with the LMS via different graphs and tables. At the top of the dashboard, the Pageviews graph shows students’ interactions with the LMS for a specific week (Figure 10) or overall across the course (Figure 11). The choice of view (by week or all) can be made using the drop down menu on the top right-hand side of the screen followed by clicking the “Change Week” button to refresh the visualisations. The Pageviews graph shows a total count of students’ access to the pages within different sections of the LMS categorised by content, communication and assessment. The content, communication and assessment categories show the total number of times pages in that category were accessed, including repeat visits to the same page. The unique pages category represents the total number of overall unique pages accessed each day. Clicking on the title of these labels (content, communication, assessment, unique pages) will remove or add these details to the graph. This is useful to focus on a single category or compare between two or more categories.

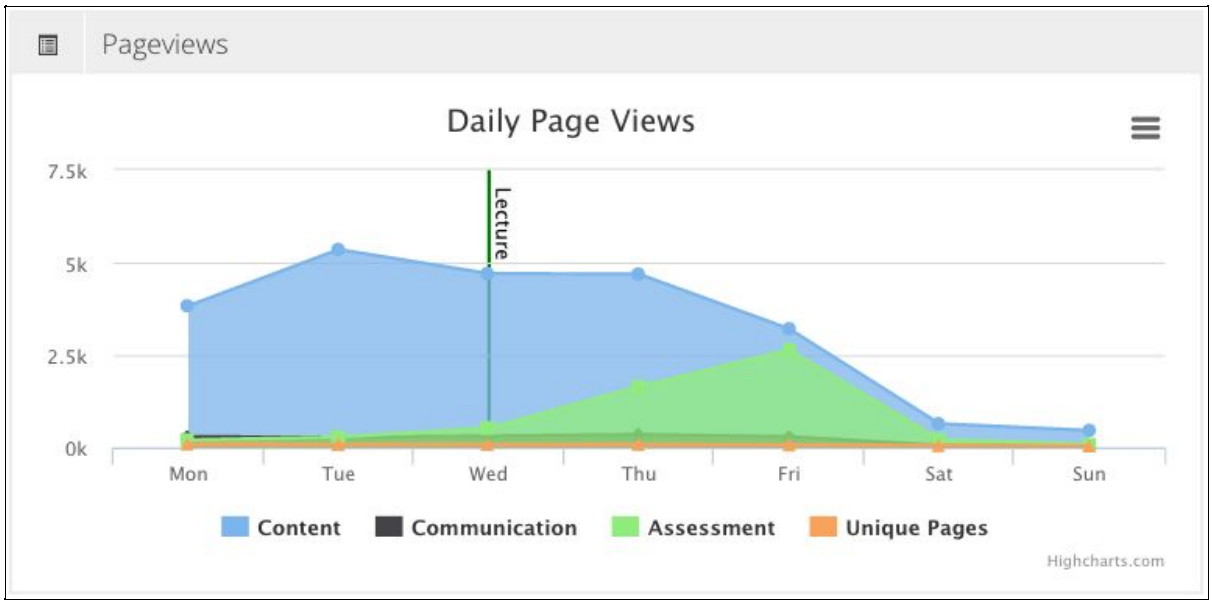


Figure 10. Pageviews graph (weekly view)

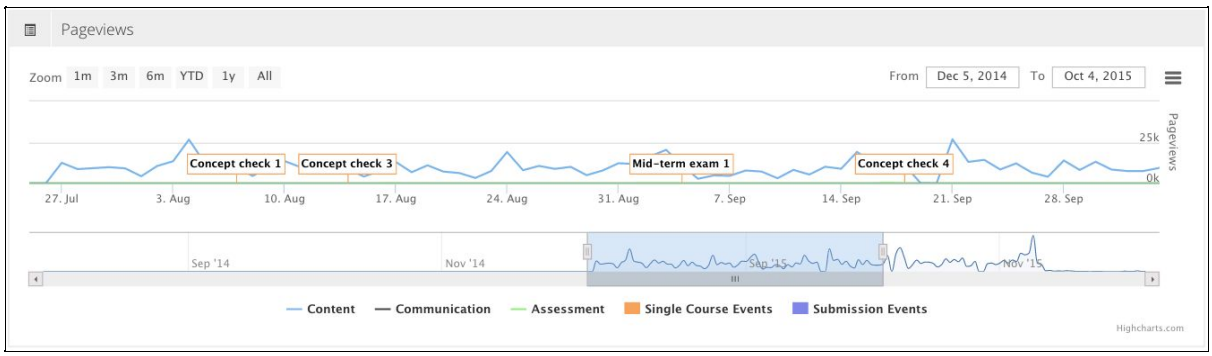


Figure 11. Pageviews graph (overall course view)

As part of the Pageview graphs, instructional events are displayed to give a point of reference for interpreting access patterns. In the weekly view graph, recurring events (e.g., lectures, tutorials, etc.) are displayed as green vertical lines (see Figure 10). On the overall course view graph, the events are represented by labels above the relevant dates (see Figure 11).

The week metrics box presents snapshots of how students interacted with the course each day of the selected week (Figure 12). The unique pageviews graph displays the number of non-repeating views across the whole site. The students graph presents the number of unique students who accessed the LMS across the week. The session graph shows the number of LMS sessions per day in the selected week. A session is defined as a period of time where the time between clicks is less than 40 minutes. The final two graphs in the week metrics box present the average session duration in minutes and the average number of pageviews per session across the selected week.

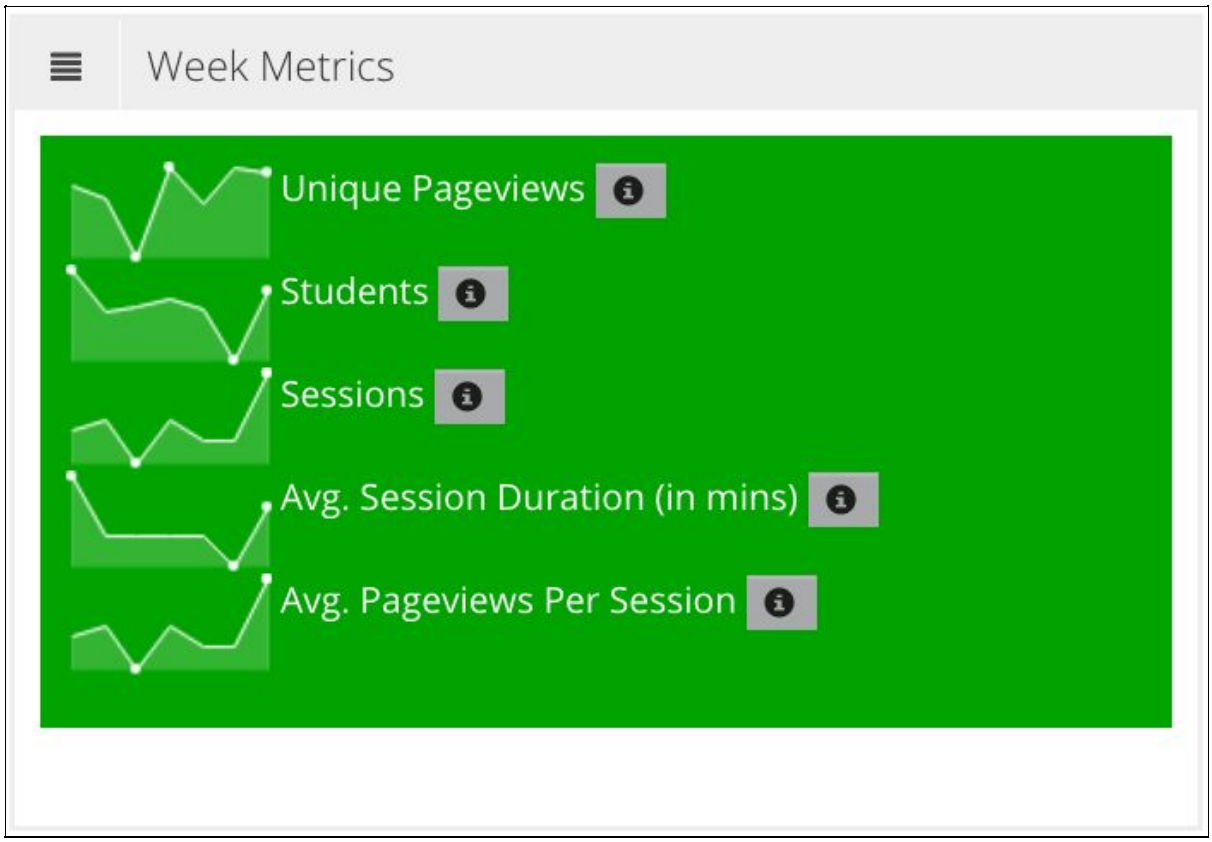


Figure 12. Week metrics box with five graphs

The student pageviews histogram shows the number of unique students who have viewed a certain range of pages in that week (Figure 13). This graph allows teachers to identify the distribution of students' access patterns in the LMS. For example, in some weeks students may access the LMS and only visit a few pages, with the distribution concentrated on the left side of the histogram. While in other weeks students may access the LMS and visit a broader range of pages, with the distribution concentrated on the right side of the histogram. Unusual or unexpected patterns can be easily identified and may prompt further investigation of students' interactions with the course.

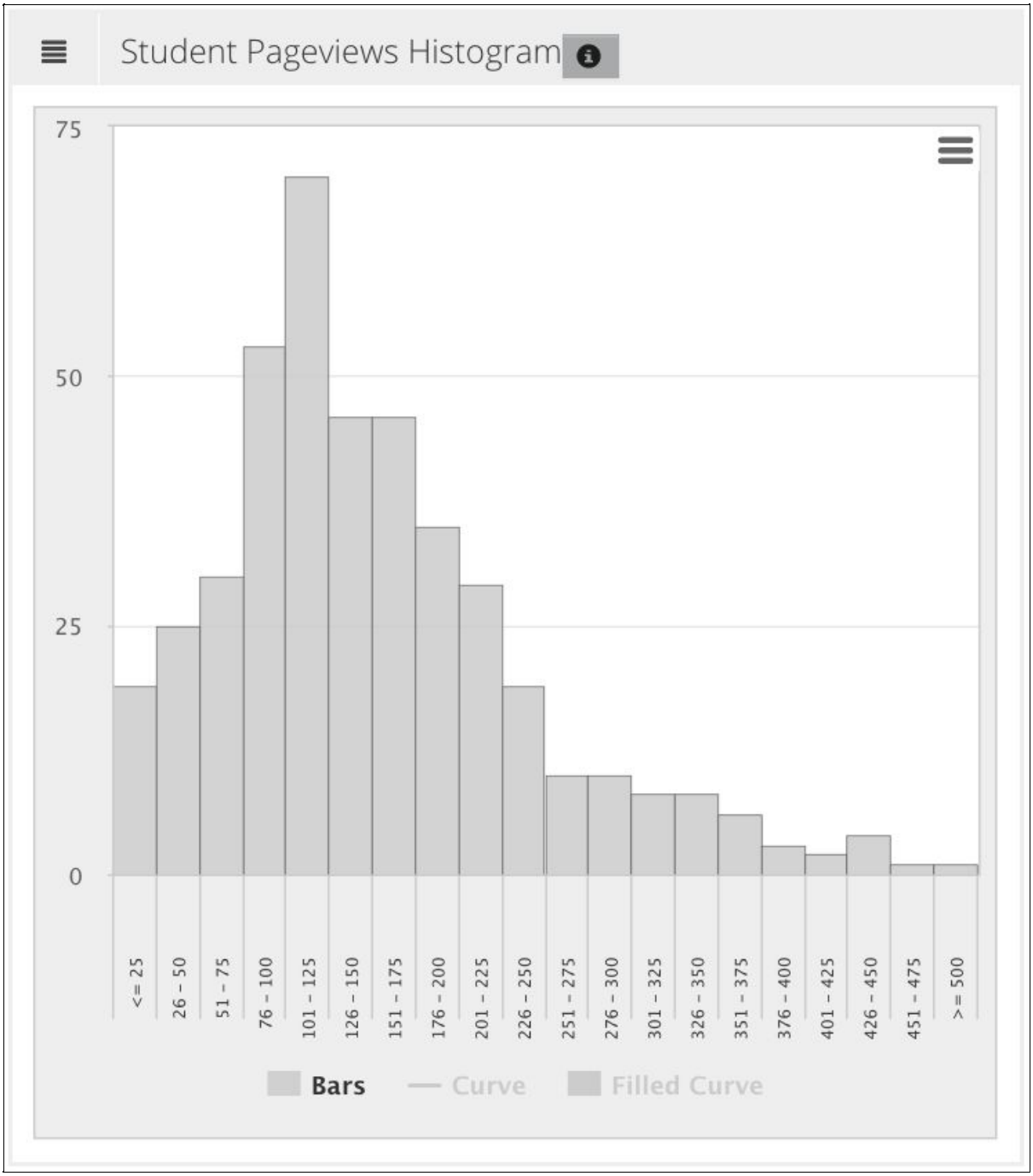


Figure 13. Student pageviews histogram with number of unique students on the vertical axes and range of unique access to pages on the horizontal axes

In addition to the graphs, the dashboard also includes four tables: top accessed content, top course visitors, communication access, and assessment access. These tables allow teachers to quickly identify the most accessed resources and the most active students (based on number of page accesses) in the LMS for the selected period of time. The top accessed content table (see Figure 14) lists the most accessed content, including the name of the page, the page type, the number of student visits and number of pageviews. The top course visitors table ranks students with the highest level of access to the LMS and includes their names and number of pageviews. Below these two tables are communication and

assessment access tables which list the communication and assessment resources accessed. The communication table includes discussion forum names, the number of unique student views, number of pageviews and number of posts. The assessment table includes the name of the assessment, the assessment type, the number of unique student views, number of attempts and average score.

Top Accessed Content

Page	Type	Student Visits	Pageviews
Week 1 Lecture Notes	resource/x-bb-folder	406	7529
Neural Integration Online Modules (Lectures 6 - 10)	resource/x-bb-folder	404	4535
Diffusion, Osmolarity & Tonicity Onine Modules (Lecture 6 part)	resource/x-bb-folder	404	4451
Skeletal Muscle Online Modules (Lectures 11, 13, 14)	resource/x-bb-folder	402	3679
--TOP--	resource/x-bb-folder	409	3620
Lecture 1: Introduction, Homeostasis and Control Systems-1	resource/x-bb-document	400	2071
Lecture 5: Embryological origins of anatomical structures 2	resource/x-bb-document	397	2045
Lecture 2: Nervous system & nerves 1	resource/x-bb-document	401	2044
Lecture 4: Embryological origins of anatomical structures 1	resource/x-bb-document	399	2034

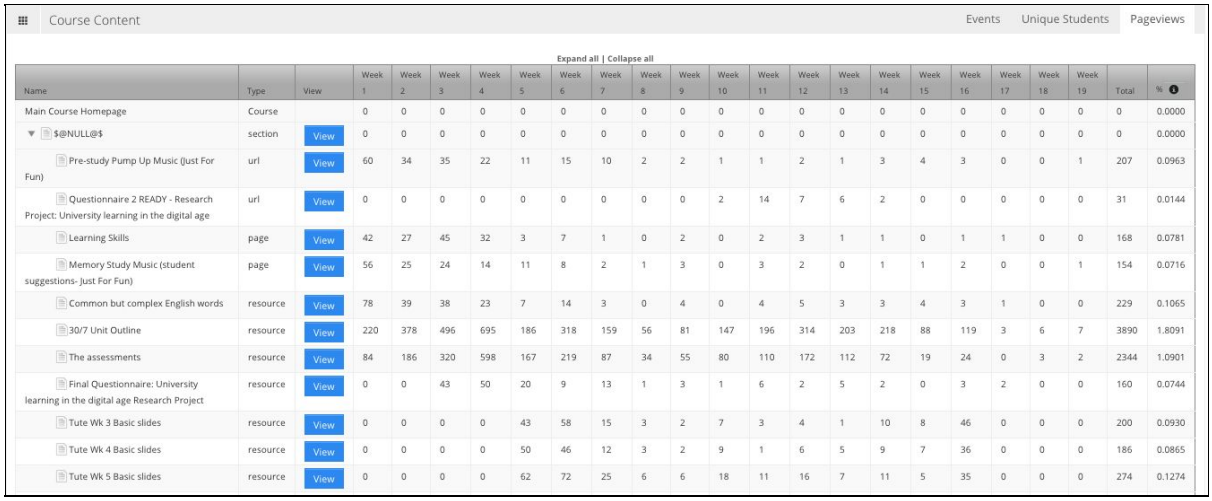
Figure 14. Top accessed content table

Course Access

The course access section is composed of three subsections: content, communication and assessment. The tables in this section are presented using the LMS course structure. This means that all content, communication (i.e., discussion boards) and assessments created in the LMS are automatically displayed in the Loop Tool. This includes all resources even if not visible to students (i.e., hidden items). To avoid the tables being too busy it is recommended that teachers delete any unnecessary resources in the LMS course before integrating it with the Loop Tool. This will minimise any difficulty in finding and visualising relevant information.

Content

In the content section, users can examine the frequency that resources have been accessed during the course. This section opens automatically to the Pageviews table (Figure 15) which presents a cumulative count of access to each page. The last column includes the percentage the resources represents of the total pageviews for the course. This helps to identify which resources have been accessed most frequently.



Name	Type	View	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16	Week 17	Week 18	Week 19	Total	%
Main Course Homepage	Course		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0000
$@NULL@$	section	View	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0000
Pre-study Pump Up Music (Just For Fun)	url	View	60	34	35	22	11	15	10	2	2	1	1	2	1	3	4	3	0	0	1	207	0.0963
Questionnaire 2 READY - Research Project: University learning in the digital age	url	View	0	0	0	0	0	0	0	0	0	2	14	7	6	2	0	0	0	0	0	31	0.0144
Learning Skills	page	View	42	27	45	32	3	7	1	0	2	0	2	3	1	1	0	1	1	0	0	168	0.0781
Memory Study Music (student suggestions- Just For Fun)	page	View	56	25	24	14	11	8	2	1	3	0	3	2	0	1	1	2	0	0	1	154	0.0716
Common but complex English words	resource	View	78	39	38	23	7	14	3	0	4	0	4	5	3	3	4	3	1	0	0	229	0.1065
30/7 Unit Outline	resource	View	220	378	496	695	186	318	159	56	81	147	196	314	203	218	88	119	3	6	7	3890	1.8091
The assessments	resource	View	84	186	320	598	167	219	87	34	55	80	110	172	112	72	19	24	0	3	2	2344	1.0901
Final Questionnaire: University learning in the digital age Research Project	resource	View	0	0	43	50	20	9	13	1	3	1	6	2	5	2	0	3	2	0	0	160	0.0744
Tute Wk 3 Basic slides	resource	View	0	0	0	0	43	58	15	3	2	7	3	4	1	10	8	46	0	0	0	200	0.0930
Tute Wk 4 Basic slides	resource	View	0	0	0	0	50	46	12	3	2	9	1	6	5	9	7	36	0	0	0	186	0.0865
Tute Wk 5 Basic slides	resource	View	0	0	0	0	62	72	25	6	6	18	11	16	7	11	5	35	0	0	0	274	0.1274

Figure 15. Pageviews table in the Course access > Content section

There are two other views available for this table and these are accessible from the top right-hand corner of the table. The unique students tab provides a table that displays a total for each resource representing the number of unique students who have accessed that resource. This gives the teacher a quick way to see how many students in relation to the total number of enrolled students who have been accessing resources in particular weeks.

The events tab provides a visualisation of students' access to each resource relative to a specific event in the course. Once the specific event has been selected from the dropdown menu at the top of the screen, the events tab presents a circle for each week indicating the percentage of students who accessed the resource before and after the event (Figure 16). The blue part of the circle indicates the percentage of students who accessed the resource before the selected event, and the red part of the circle represents the percentage who accessed the resource after the event. The size of the circle is relative to the number of views. Larger circles indicate a higher number of views. The percentage and total number of students' access before and after the event can be viewed by hovering the mouse over the circle.

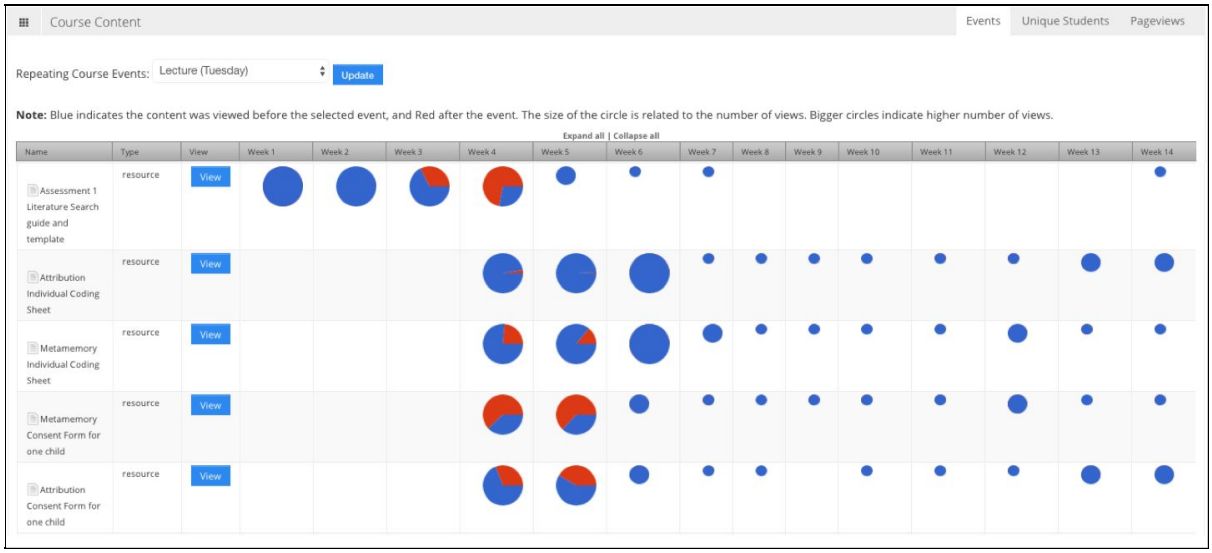


Figure 16. Events tab in the Course access > Content section

From each of the tables in the content section there is an option to view more detailed information about the resource by clicking on the “View” button next to the relevant resource. These resource pages contain a pageviews graph, a histogram graph and a table listing students who have not yet accessed the resource. The pageviews graph shows the trend of student access to the selected resource across the course (Figure 17) as well as in relation to critical events across the course timeline.

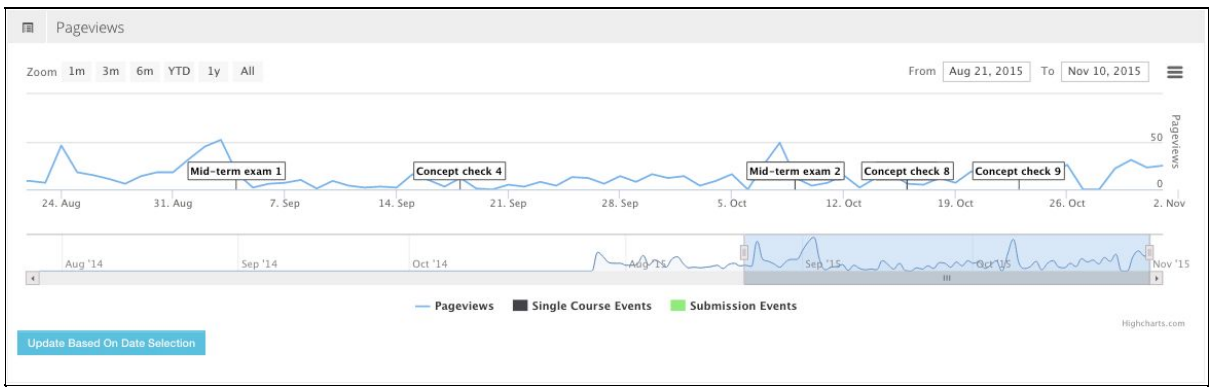


Figure 17. Pageviews graph of students’ access to a specific resource across the course

The student pageviews histogram presents the number of unique students who have viewed the selected resource within a certain range of times during the course (Figure 18). This graph allows teachers to identify the distribution of students’ patterns of access to this specific resource.

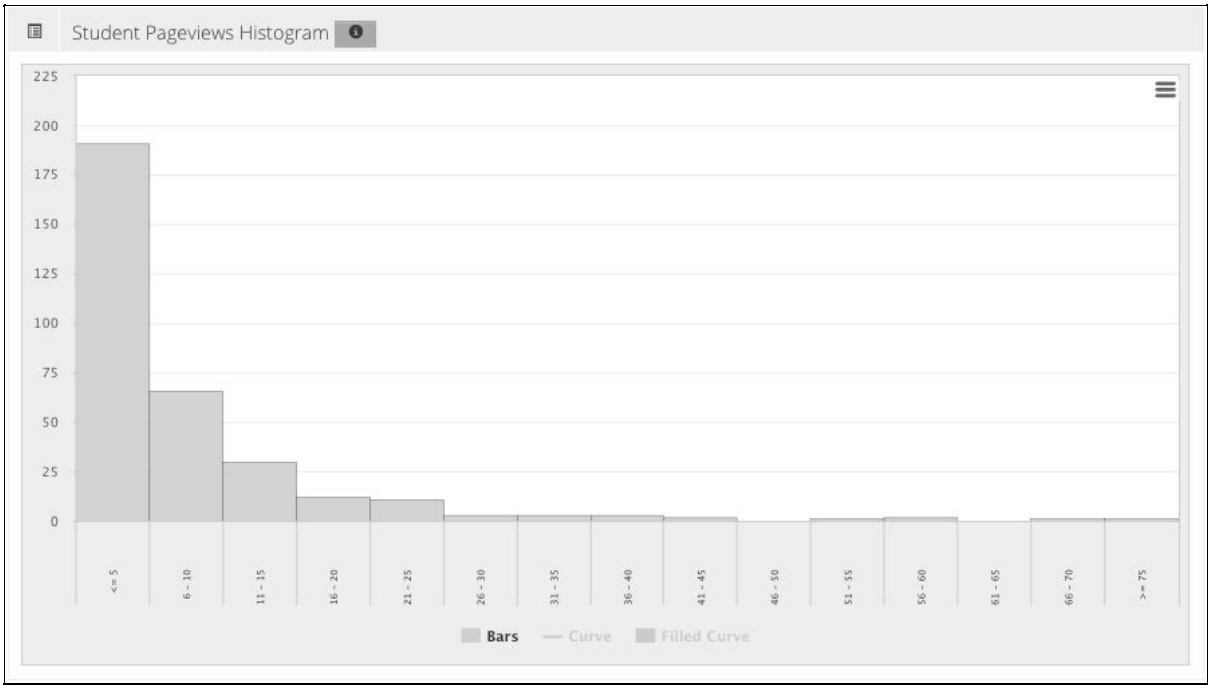
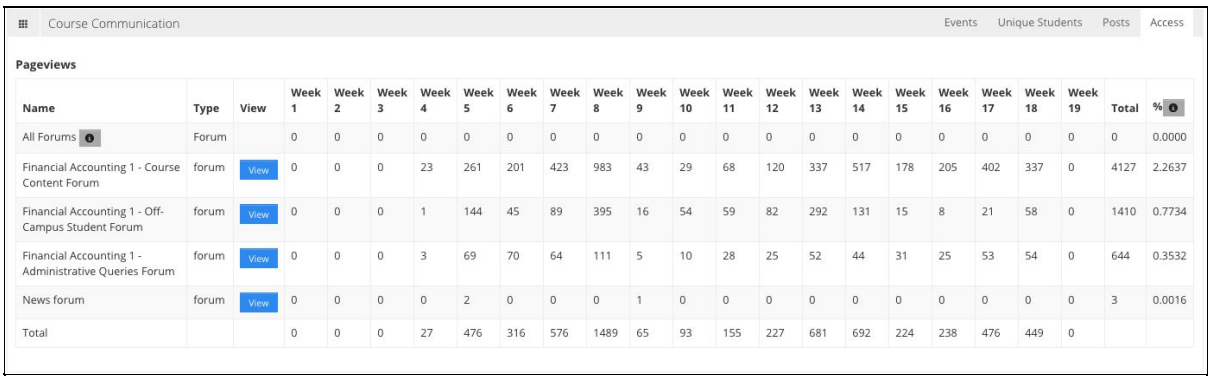


Figure 18. Student pageviews histogram with number of unique students on the vertical axes and range of number of access to the selected page on the horizontal axes

The students with no views table at the bottom of the page lists all students who have not accessed the specific resource so far. The table includes students' names and email addresses. Teachers can use this information to contact students if engagement with the resource is critical to the learning design of the course.

Communication

The communication section of the Loop Tool presents information relating to students' interactions with discussion forums within the LMS. This section opens automatically on the access table which shows the page access totals for each discussion forum in the course (Figure 19). These figures relate to the number of times the discussion forum has been viewed. The last column presents the percentage of views for the discussion forum in relation to the total pageviews for the course.



Name	Type	View	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16	Week 17	Week 18	Week 19	Total	%
All Forums	Forum		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0000
Financial Accounting 1 - Course Content Forum	forum	View	0	0	0	23	261	201	423	983	43	29	68	120	337	517	178	205	402	337	0	4127	2.2637
Financial Accounting 1 - Off-Campus Student Forum	forum	View	0	0	0	1	144	45	89	395	16	54	59	82	292	131	15	8	21	58	0	1410	0.7734
Financial Accounting 1 - Administrative Queries Forum	forum	View	0	0	0	3	69	70	64	111	5	10	28	25	52	44	31	25	53	54	0	644	0.3532
News forum	forum	View	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3	0.0016
Total			0	0	0	27	476	316	576	1489	65	93	155	227	681	692	224	238	476	449	0		

Figure 19. Access table in the *Course access* > *Communication* section

Similar to the content section, the course communication table has a number of tabs accessible from the top right-hand corner. The posts tab presents the total number of posts students have made to each discussion forum per week and in total. The unique students tab shows the number of unique students who have viewed each discussion forum across the weeks of the course and in total. The events tab provides a visualisation of students' access to each discussion forum relative to a specific event in the course. Once the specific event has been selected from the dropdown menu at the top of the screen, the events tab presents a circle for each week indicating the percentage of views before and after the event. The blue part of the circle indicates the percentage of views before the selected event, and the red part of the circle represents the percentage of views after the event. The size of the circle is relative to the number of views. Larger circles indicate a higher number of views. The percentage and total number of students' access before and after the event can be viewed by hovering the mouse over the circle.

From each discussion board there is an option to view more detailed information by clicking on the "View" button. This detailed discussion forum page contains a pageviews graph, a histogram graph and a table listing students who have not yet accessed the discussion forum. The pageviews graph shows the trend of student access to the selected discussion forum across the course (Figure 20) as well as in relation to critical events across the course timeline.

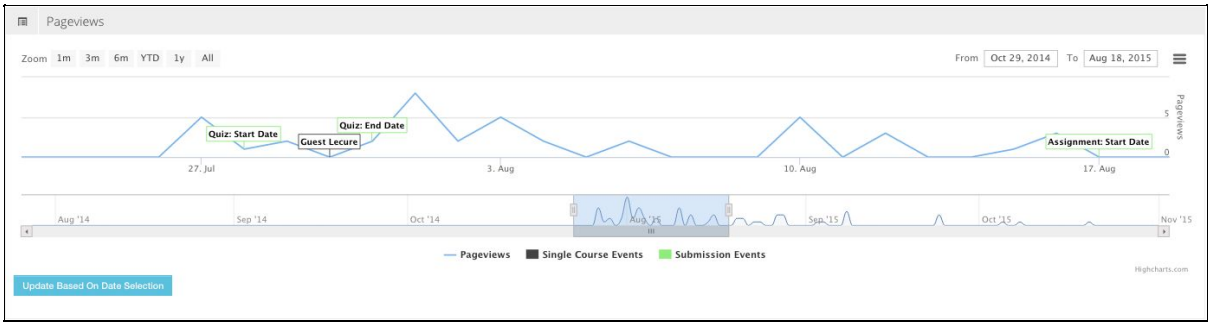
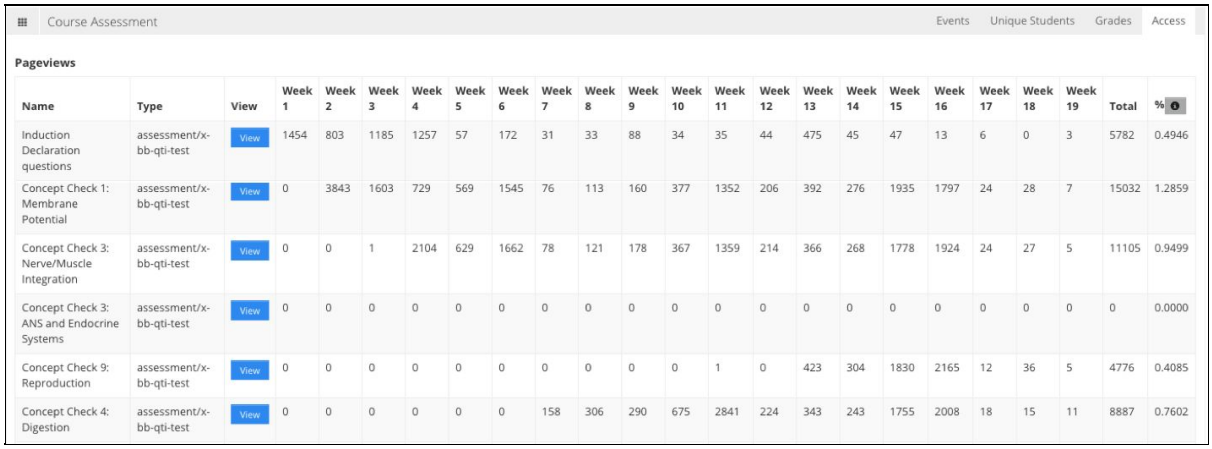


Figure 20. Students' access to a specific discussion board across the course

The student pageviews histogram presents the number of unique students who have viewed the selected discussion forum within a certain range of times during the course. This graph allows teachers to identify the distribution of students' patterns of access to this specific discussion forum. The students with no views table at the bottom of the page lists all students who have not accessed the specific discussion forum so far. The table includes students' names and email addresses. Teachers can use this information to contact students if engagement with the discussion forum is critical to the learning design of the course.

Assessment

The assessment section presents students' interactions with the online quizzes and other assessment items within the LMS. This section opens automatically on the access table which shows the page access totals for each assessment item in the course (Figure 21). These figures relate to the number of times the assessment item has been viewed. The last column presents the percentage of views for the assessment item in relation to the total pageviews for the course.



Name	Type	View	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16	Week 17	Week 18	Week 19	Total	%
Induction Declaration questions	assessment/x-bb-qti-test	View	1454	803	1185	1257	57	172	31	33	88	34	35	44	475	45	47	13	6	0	3	5782	0.4946
Concept Check 1: Membrane Potential	assessment/x-bb-qti-test	View	0	3843	1603	729	569	1545	76	113	160	377	1352	206	392	276	1935	1797	24	28	7	15032	1.2859
Concept Check 3: Nerve/Muscle Integration	assessment/x-bb-qti-test	View	0	0	1	2104	629	1662	78	121	178	367	1359	214	366	268	1778	1924	24	27	5	11105	0.9499
Concept Check 3: ANS and Endocrine Systems	assessment/x-bb-qti-test	View	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0000
Concept Check 9: Reproduction	assessment/x-bb-qti-test	View	0	0	0	0	0	0	0	0	0	0	1	0	423	304	1830	2165	12	36	5	4776	0.4085
Concept Check 4: Digestion	assessment/x-bb-qti-test	View	0	0	0	0	0	0	158	306	290	675	2841	224	343	243	1755	2008	18	15	11	8887	0.7602

Figure 21. Access table in the *Course access* > *Assessment* section

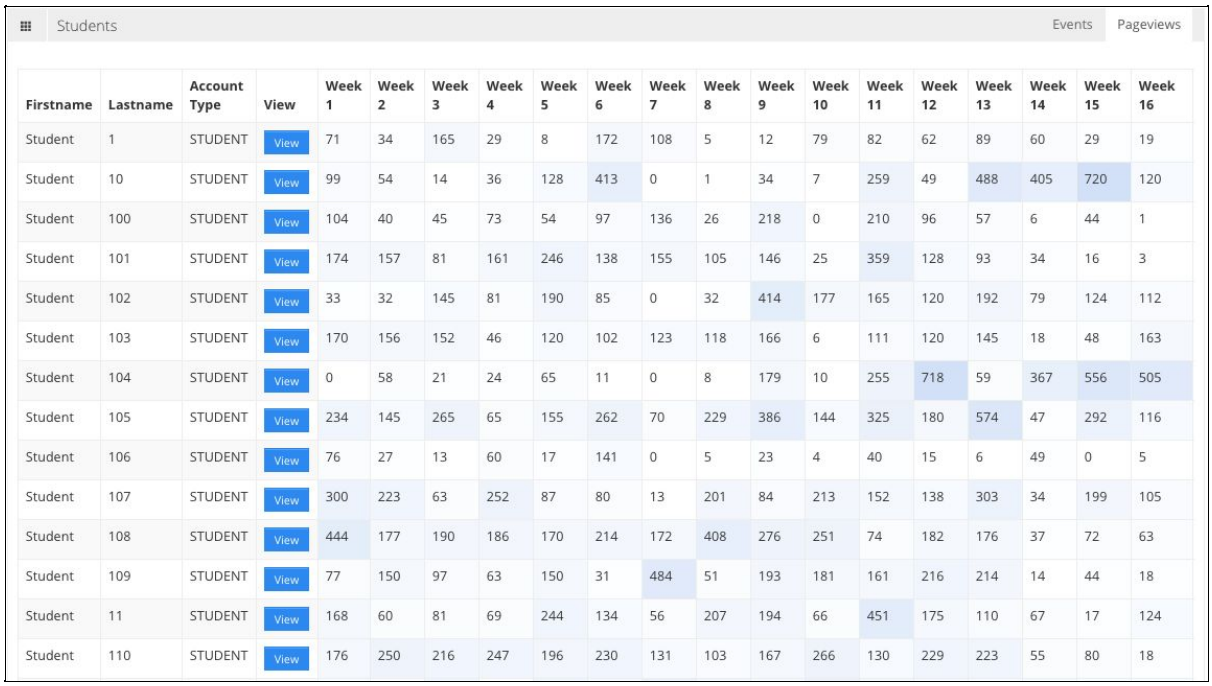
Similar to the content and communication sections, the course assessment table has a number of tabs accessible from the top right-hand corner. The grades tab presents each student's score for each assessment across the course. The unique students tab shows the number of unique students who have viewed each assessment item across the weeks of the course and in total. The events tab provides a visualisation of students' access to each assessment item relative to a specific event in the course. Once the specific event has been selected from the dropdown menu at the top of the screen, the events tab presents a circle for each week indicating the percentage of views before and after the event. The blue part of the circle indicates the percentage of students who viewed the assessment item before the selected event, and the red part of the circle represents the percentage of views after the event. The size of the circle is relative to the number of views. Larger circles indicate a higher number of views. The percentage and total number of students' access before and after the event can be viewed by hovering the mouse over the circle.

Students' interaction with specific assessments can be examined in more detail by clicking on the "View" button next to the assessment item. This view includes a pageviews graph, a pageviews histogram, and a table that lists students with no views of the selected assessment. The pageviews graph shows the trend of student access to the selected assessment item across the course as well as in relation to critical events across the course timeline.

The student pageviews histogram presents the number of unique students who have viewed the selected assessment item within a certain range of times during the course. This graph allows teachers to identify the distribution of students' patterns of access to this specific assessment item. The students with no views table at the bottom of the page lists all students who have not accessed the specific assessment item so far. The table includes students' names and email addresses. Teachers can use this information to contact students if engagement with the assessment item is critical to the learning design of the course.

Students

The students section of the Learning Analytics Tool allows examination of each student's interaction with the LMS. The pageviews table (Figure 22) presents a cumulative count of views of pages in the course by week and in total. This includes views of content, communication and assessment pages. Shading is used to highlight high number of views (dark blue) as well as no views (white).



Firstname	Lastname	Account Type	View	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16
Student	1	STUDENT	View	71	34	165	29	8	172	108	5	12	79	82	62	89	60	29	19
Student	10	STUDENT	View	99	54	14	36	128	413	0	1	34	7	259	49	488	405	720	120
Student	100	STUDENT	View	104	40	45	73	54	97	136	26	218	0	210	96	57	6	44	1
Student	101	STUDENT	View	174	157	81	161	246	138	155	105	146	25	359	128	93	34	16	3
Student	102	STUDENT	View	33	32	145	81	190	85	0	32	414	177	165	120	192	79	124	112
Student	103	STUDENT	View	170	156	152	46	120	102	123	118	166	6	111	120	145	18	48	163
Student	104	STUDENT	View	0	58	21	24	65	11	0	8	179	10	255	718	59	367	556	505
Student	105	STUDENT	View	234	145	265	65	155	262	70	229	386	144	325	180	574	47	292	116
Student	106	STUDENT	View	76	27	13	60	17	141	0	5	23	4	40	15	6	49	0	5
Student	107	STUDENT	View	300	223	63	252	87	80	13	201	84	213	152	138	303	34	199	105
Student	108	STUDENT	View	444	177	190	186	170	214	172	408	276	251	74	182	176	37	72	63
Student	109	STUDENT	View	77	150	97	63	150	31	484	51	193	181	161	216	214	14	44	18
Student	11	STUDENT	View	168	60	81	69	244	134	56	207	194	66	451	175	110	67	17	124
Student	110	STUDENT	View	176	250	216	247	196	230	131	103	167	266	130	229	223	55	80	18

Figure 22. Pageviews table with shading relative to each students' number of access

The events tab provides a visualisation of students' overall access to the LMS relative to a specific event in the course (Figure 23). Once the specific event has been selected, the events graph presents a circle indicating the percentage of access to the LMS before and after the event. The blue part of the circle indicates indicates the percentage of students who accessed the LMS before the selected event, and the red part of the circle represents the percentage who accessed the LMS after the event. The size of the circle is relative to the number of views. Larger circles indicate a higher number of views. The percentage and total number of students' access before and after the event can be viewed by hovering the mouse over the circle.

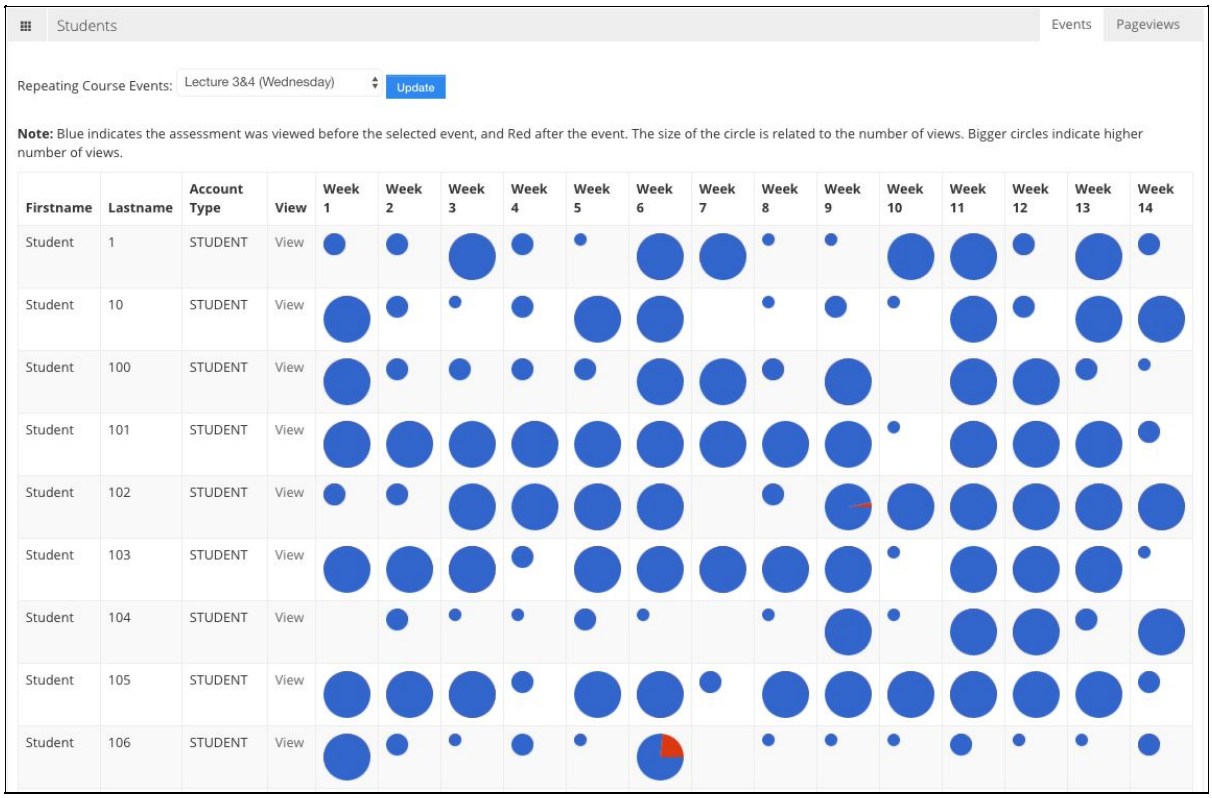


Figure 23. Events tab in the students section

Similar to the course access section, the interaction of a specific student with the LMS can be examined by clicking on the “View” button. The pageviews graph (Figure 24) presents the selected student access to content (blue line), communication (black line), and assessment items (green line).

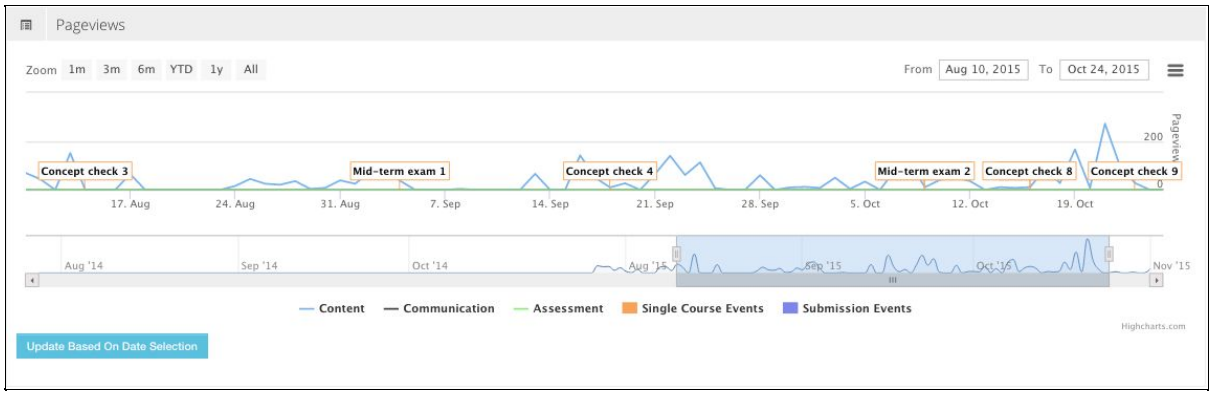


Figure 24. An individual student’s access to the LMS

The two tables below the pageviews graph list all communication and assessment items the selected student has interacted with across the course. The communication table includes the details of the discussion forums with which the student has interacted, including name, number of views and number of posts. The assessment table includes details of the assessment items with which the student has interacted, including the number of views, attempts and average student score.