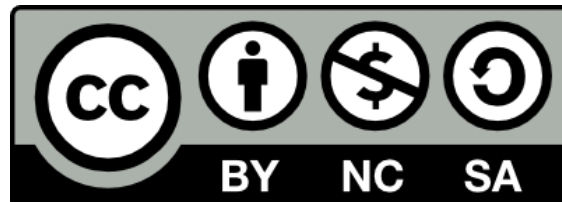




SYMPOSIUM ON LEARNING ANALYTICS AT MICHIGAN



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Developing CTools Academic Analytics: Possibilities and Challenges

Daniel L. Kiskis

ITS Teaching and Learning

Academic Analytics Space

- Audience
 - Instructors of a course
 - Academic Advisors
 - Students
 - Collaborators
 - Administrators at the Dept. level or higher
 - University Executives
 - Researchers

Academic Analytics Space

- Data of interest
 - Usage of the Learning Management System (LMS), i.e. CTools
 - Formative Evaluations
 - Summative Evaluations
 - Student Information System content
 - Entrance Test scores, incl. ACT, SAT, GRE, etc.
 - Demographics
 - Academic Record
 - Financials
 - HR data

ITS Academic Analytics Project

- Collaboration between ITS units
 - Teaching and Learning
 - Enabling Technologies (Business Intelligence)
 - Student Administration Products and Services
- Progress so far
 - Moved CTools event and session archive to the NextGen Data Warehouse
 - Production level system
 - Allows access from a broad range of tools
 - Conceptual data modeling
 - Developed initial prototype of reporting of course site usage
 - Target audience is course instructors
 - Overall site usage
 - Individual student behavior
 - When and how different tools are being used on the site

CTools Usage Data

- Over 160 different types of events logged
 - Presence in a site
 - Read, create, modify, delete, submit in different tools
- Collected since CTools came on-line (circa 2004)
- Data in current event archive since January 1, 2007
 - Over 1.1 Billion events
 - 66 Million Unique sessions (login/logout)
- Typical day
 - ~87,000 sessions
 - ~1.9 Million events
 - ~50,000 site visits (course, project, My Workspace, Gradtools, portfolio)
- Nightly archive of event and session logs to the data warehouse
 - 24 hours of logs kept in production database

Analytics Tool Prototype

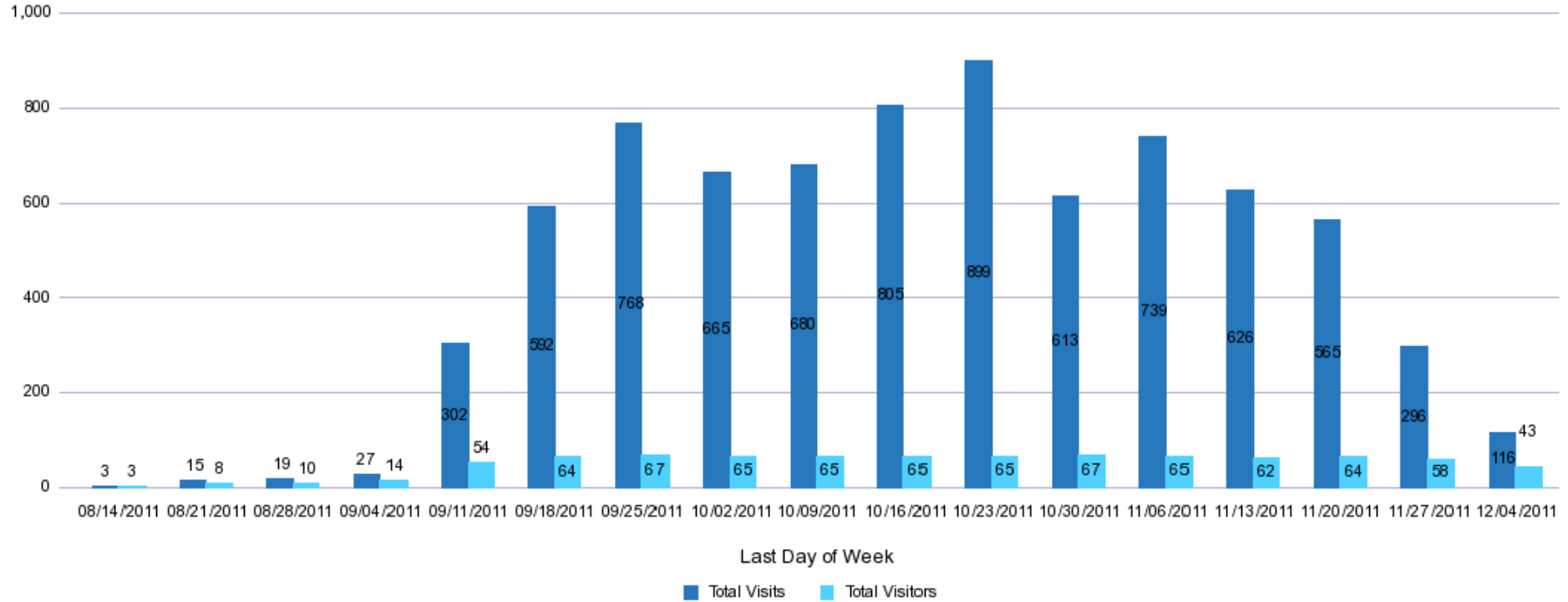
- Analytics from a course site active this semester, Fall 2011
- Selected because it used a variety of tools on the site
- All identifiers have been anonymized for this presentation
- Graphs and tables were generated using Business Objects which accesses the CTools event and session archives in the NextGen Data Warehouse
- Audience is the instructor(s) for a course site

Instructor Analytics

- What are the usage patterns for my course site?
- How many visits does my site get?
- When is my site being visited?
- What tools are being used and how much?

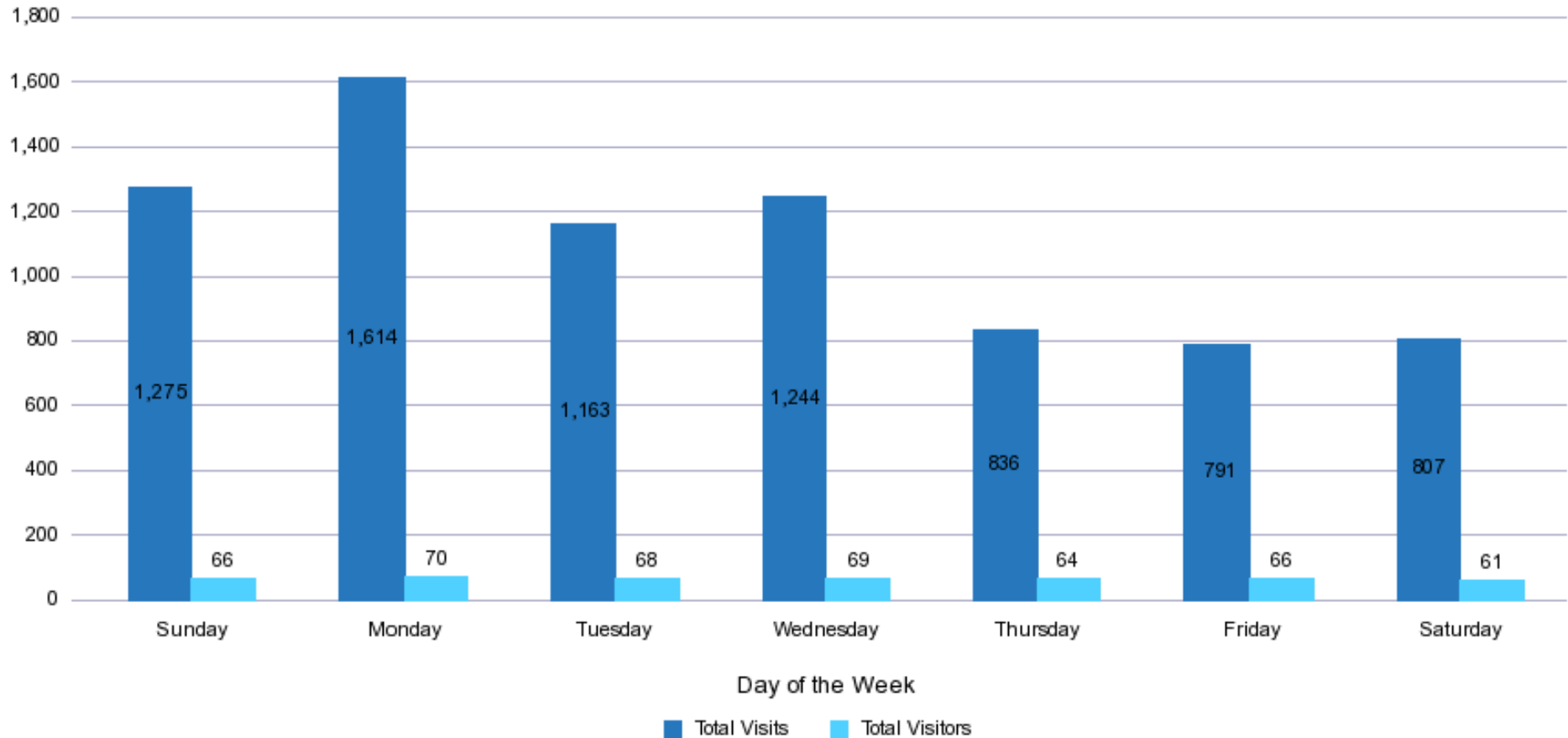
Weekly Visits

Site Visits per Week



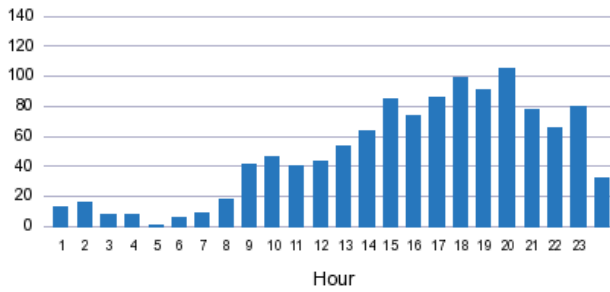
Day of the Week Report

Site Visits per Day of Week

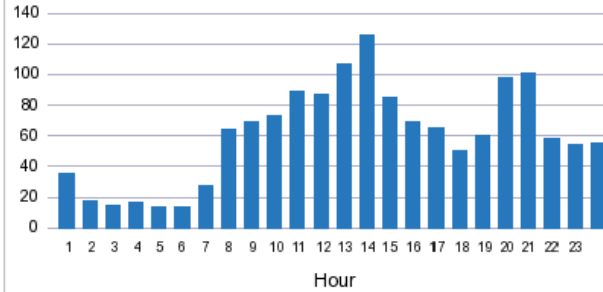


Hourly Visit Pattern

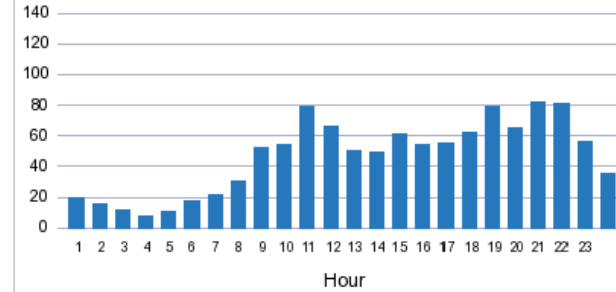
Sunday



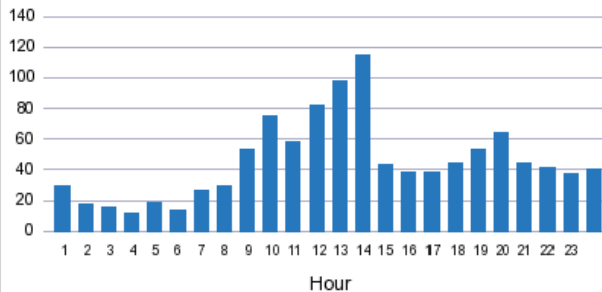
Monday



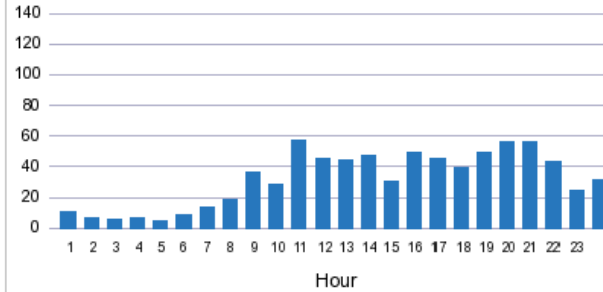
Tuesday



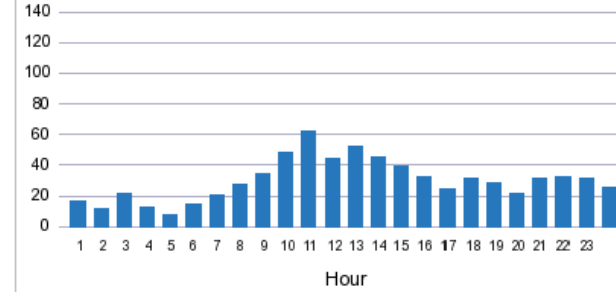
Wednesday



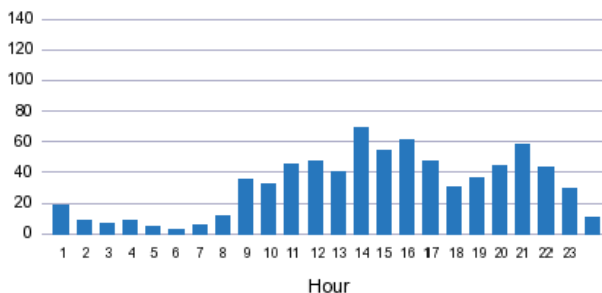
Thursday



Friday

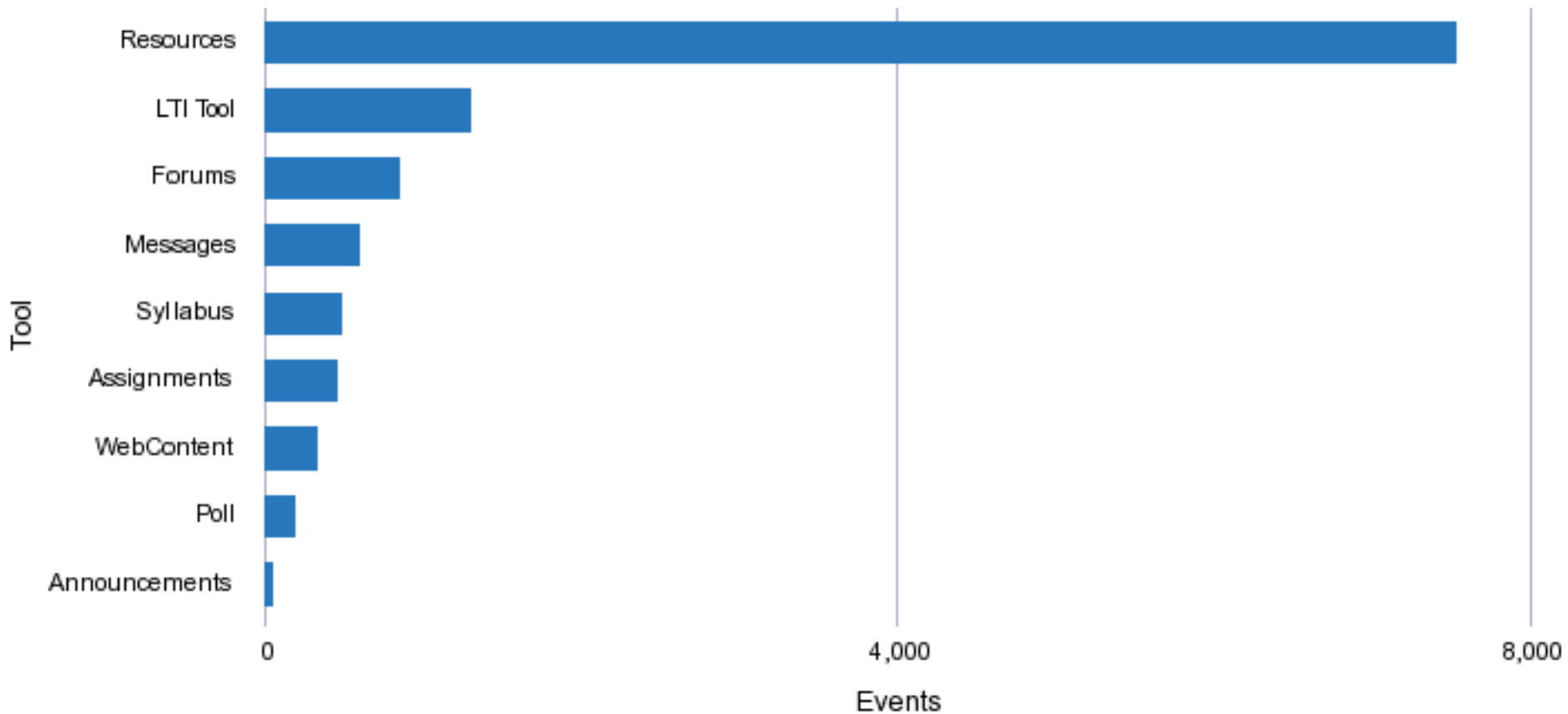


Saturday



Overall Tool Usage

Events by Tool



Overall Tool Usage

Tool	Events	% of Total
Resources	7,510	64%
LTI Tool	1,303	11%
Forums	852	7%
Messages	600	5%
Syllabus	488	4%
Assignments	458	4%
WebContent	327	3%
Poll	179	2%
Announcements	43	0%
	11,760	100%

Instructor Analytics

- Which students are using the site the most?
- Which students are using the site the least?
- What tools are these students using?

Individual Activity

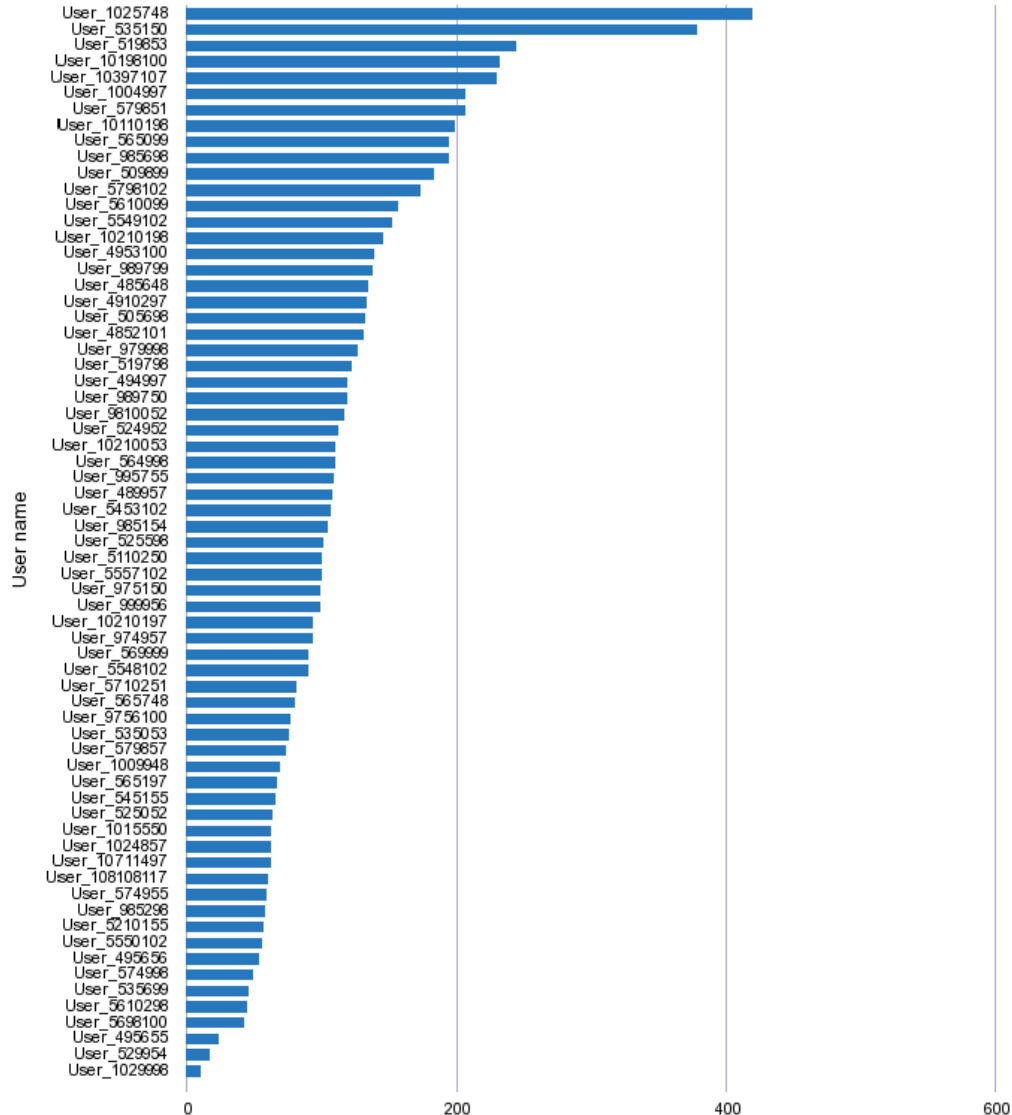
10 most active users

Site Member	Events on Site
User_1025748	310
User_535150	285
User_10198100	202
User_519853	201
User_10397107	176
User_579851	165
User_1004997	157
User_985698	154
User_10110198	150
User_5798102	149

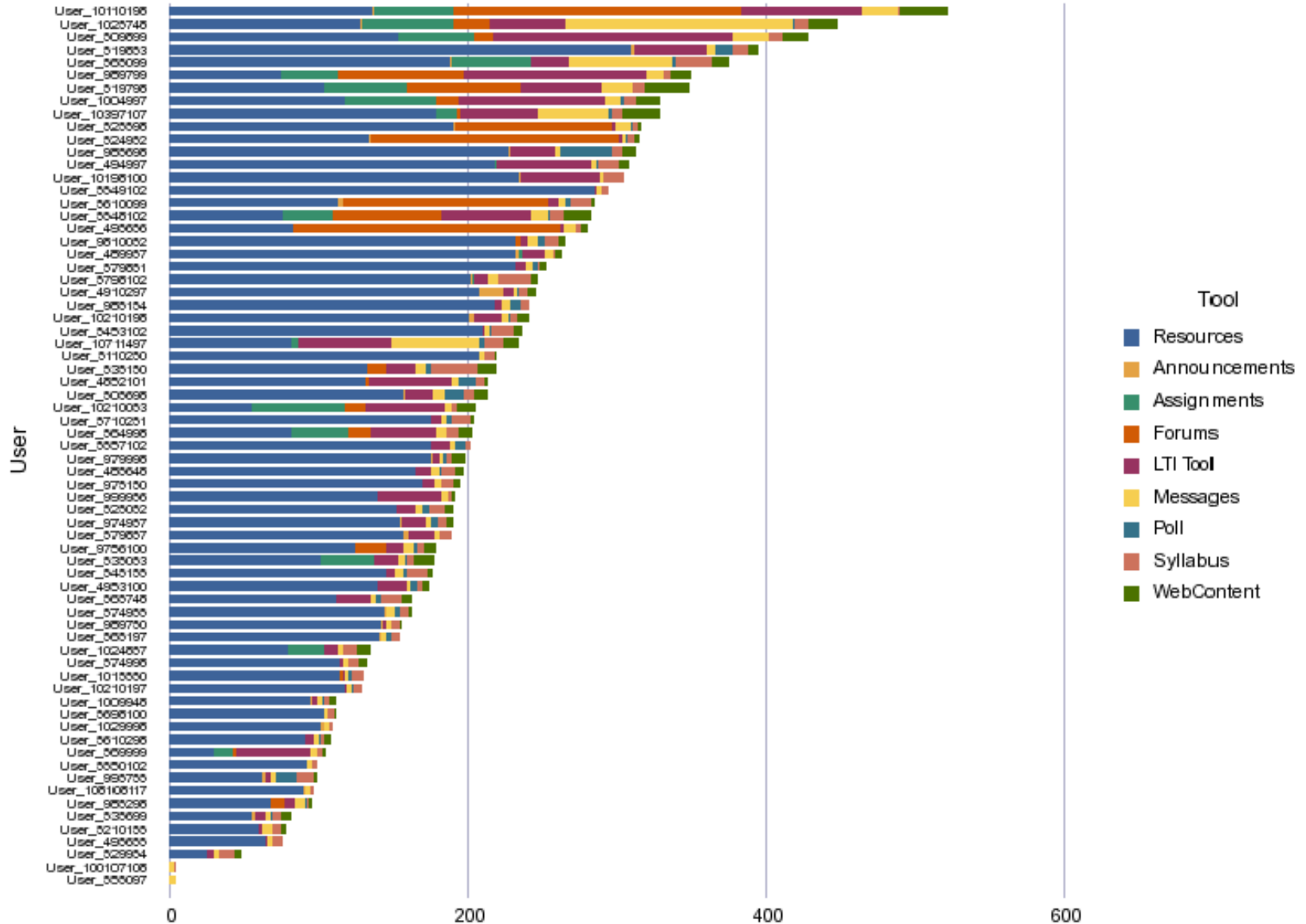
10 least active users

Site Member	Events on Site
User_1029998	9
User_495655	15
User_529954	16
User_574998	30
User_495656	31
User_5698100	33
User_5610298	38
User_985298	39
User_535699	40
User_574955	42

Number of Visits by Each User



Number of Events by User by Tool



Relative Tool Usage

0-10th percentile

10th-20th percentile

20th-30th percentile

	Presence	Resources	Assignments	Forums	LTI Tool	Messages	Poll	Syllabus	WebContent
User_555097	2	0	0	0	0	4	0	0	0
User_529954	32	26	0	0	4	4	0	10	4
User_496655	44	65	0	0	1	4	0	5	0
User_1023998	20	102	0	0	1	3	0	1	0
User_536699	90	96	0	0	7	3	2	6	5
User_5210155	112	80	0	0	3	7	0	5	3
User_5610298	98	92	0	0	6	3	1	3	3
User_5698100	82	104	0	0	0	3	0	4	1
User_985298	114	89	0	9	7	7	1	2	1
User_5550102	110	93	0	0	0	3	0	5	1
User_108108117	118	91	0	0	0	3	0	1	0
User_574998	98	115	0	0	2	4	0	7	4
User_1009948	138	95	0	0	4	3	1	5	5
User_1015550	124	115	0	2	1	3	2	7	0
User_1024487	124	80	24	0	10	3	0	10	8
User_574955	115	145	0	0	0	5	3	6	2
User_569999	180	30	13	2	50	5	0	3	1
User_565197	132	142	0	0	0	3	3	5	0
User_548155	130	146	0	0	5	6	2	14	2
User_10210197	188	119	0	0	1	3	1	5	0
User_525052	126	152	0	0	13	5	4	11	5
User_995755	218	83	0	0	4	3	14	13	2
User_565748	158	113	0	0	23	3	4	14	7
User_538053	148	102	38	0	15	5	1	5	13
User_579857	146	157	0	0	18	3	0	7	0
User_9756100	152	125	0	20	11	7	2	6	8
User_10711497	122	83	4	0	82	59	3	13	10
User_5710251	160	175	0	0	8	3	3	14	1
User_974957	188	155	0	0	16	3	5	6	3
User_496656	108	84	0	179	2	8	0	4	3
User_999956	196	141	0	0	42	4	0	3	1
User_975150	196	170	0	0	8	4	0	9	3
User_89750	238	143	0	0	2	3	0	5	1
User_5557102	200	176	0	0	12	4	7	2	0
User_5110280	198	208	0	0	0	3	1	6	1
User_564998	219	83	38	15	43	7	0	8	8
User_10210053	220	56	62	15	52	5	0	3	12
User_5453102	212	210	0	0	2	3	1	15	5
User_979998	250	176	0	0	4	3	2	5	8
User_4953100	276	141	0	0	18	3	4	4	3
User_985154	208	218	0	0	5	6	7	5	0
User_5548102	178	77	33	72	61	12	1	9	17
User_485648	265	165	0	0	10	6	2	10	4
User_505896	262	157	0	0	19	8	13	7	8
User_4852101	260	133	0	2	55	4	12	6	3
User_489957	216	232	2	0	15	6	0	1	4
User_4910297	264	208	0	0	7	3	1	6	4
User_9810052	231	233	0	3	5	7	4	10	3
User_525596	202	191	0	106	2	10	1	4	1
User_10210198	290	201	0	0	19	5	1	6	7
User_524952	224	135	0	166	2	3	1	6	2
User_494997	238	219	1	0	63	4	1	14	6
User_519796	244	105	54	77	54	21	0	9	27
User_5798102	346	202	1	0	10	7	0	22	3
User_5610099	312	114	0	138	7	4	4	17	2
User_5549102	302	286	0	0	1	4	0	5	1
User_89799	274	76	38	84	123	10	0	5	13
User_579851	412	232	0	0	7	5	3	2	3
User_985896	388	228	0	0	30	4	35	7	8
User_1004997	412	119	60	15	99	10	3	8	18
User_565099	388	188	54	0	26	68	2	25	10
User_10198100	483	235	0	0	53	3	0	12	0
User_10397107	459	179	14	2	53	47	3	6	25
User_509899	366	153	51	13	161	24	0	10	16
User_519853	488	310	0	0	47	6	12	11	6
User_10110198	396	137	53	193	81	24	0	2	30
User_535150	755	134	0	12	19	7	4	43	15
User_1025748	838	129	61	24	51	152	2	9	19

Overall Resource Downloads

Folder	Document	0
Folder12	Document27	152
Folder13	Document30	167
	Document40	166
Folder14	Document33	169
	Document36	115
Folder25	Document34	38
	Document42	26
Folder5	Document27	584
	Document33	281
	Document32	236
	Document40	123
	Document35	25
	Document36	10
Folder6	Document34	103
Folder7	Document44	16
	Document73	10
	Document37	9
	Document31	8
	Document58	8
Folder9	Document22	1635
	Document21	821
	Document35	327
	Document16	324
	Document29	274
	Document48	272
	Document28	263
	Document31	213
	Document40	207
	Document52	165
	Document38	160
	Document25	148
	Document43	139
	Document54	109
	Document39	73
	Document46	70
	Document59	64

Resource Downloads per Week

	08/14/2011	08/21/2011	08/28/2011	09/04/2011	09/11/2011	09/18/2011	09/25/2011	10/02/2011	10/09/2011	10/16/2011	10/23/2011	10/30/2011	11/06/2011	11/13/2011	11/20/2011	11/27/2011	12/04/2011
Folder12 / Document27											97	44	11	2	5	1	
Folder13 / Document30										25	63	52	7		1		
Folder13 / Document40											79	78	9	1	2		
Folder14 / Document33							33	27	57	12	19	18	3		2		
Folder14 / Document36									48	19	26	20	2		2		
Folder25 / Document34												20	21	73	59	8	
Folder25 / Document42												11	16	38	42	4	
Folder5 / Document27						161	213	30	114	51	3	2	11	27	4		1
Folder5 / Document31															17	40	7
Folder5 / Document32									6	29	12	48	159	41	5	4	
Folder5 / Document33								4	57	26	13	48	150	100	32	44	17
Folder5 / Document35											13	8	5	5	3	1	
Folder5 / Document36													10	54	27	56	12
Folder5 / Document40										7	9	28	95	21	2	2	
Folder5 / Document42																	15
Folder6 / Document34												37	66	4	3	4	1
Folder6 / Document38														21	10	5	
Folder7 / Document27																	3
Folder7 / Document29																	3
Folder7 / Document31													9	1		2	
Folder7 / Document37													9	1		2	
Folder7 / Document44													17	2		5	
Folder7 / Document46															3	2	
Folder7 / Document47															3	2	
Folder7 / Document48															3	3	
Folder7 / Document50															5	2	4
Folder7 / Document52																	4
Folder7 / Document58													9	1	1	2	
Folder7 / Document61															6	2	
Folder7 / Document73													11	1	1	2	
Folder9 / Document16						208	34	82									
Folder9 / Document21							225	96	105	87	167	84	63	113	117	3	
Folder9 / Document22				183	198	397	197	145	152	156	120	113	86	60	36	15	
Folder9 / Document25										68	58	22	1	2	5	47	
Folder9 / Document26								6	82	115	34	23	3		2		
Folder9 / Document29							182	67	5	2	3	1	16		3		
Folder9 / Document31								8	38	84	63	29	11	6			
Folder9 / Document35							25	96	112	39	27	12	17	9	18		1
Folder9 / Document37															33	19	8
Folder9 / Document38										100	49	11	1	1			
Folder9 / Document39								17	13	26	17		1	1			
Folder9 / Document40								28	70	49	39	9	13	4	14	1	3

Project Deliverables

- Analytics displays and dashboards
 - Site statistics
 - Student activity
- Learning Analytics Data Warehouse
 - Structured based on the information in the data
 - Summary tables and other optimizations
 - Available as a service to support analytics projects across the University

Next Steps

- Engage community
 - Determine initial Audience and Data
 - Develop useful reporting analytics
 - What do you want to know?
 - What additional information can we provide from this data?
 - What other data should we include?
 - Explore presentation and delivery methods
 - Graphics or tables
 - Embed in CTools site, email (Excel, PDF), web site, Business Objects
 - Develop access rules
 - Level of analytics
 - Reporting, Ad hoc reports, alerts, predictive analysis

Next Steps

- Plan and execute a pilot deployment
- Site Statistics
 - Engage instructors and choose courses
- Student Intervention Support
 - Identify cohorts
 - Engage advisors
- Establish a time period
- Determine what data to collect to measure success
- Develop technology and procedures to provide the analytics

Next Steps

- Analyze and restructure database
 - Driven by which queries are needed to produce the desired analytics
 - Summary tables
 - By date
 - By site
 - Parse event data to extract meaningful information
 - Which tool
 - Resource path
- Bring in data from other sources
 - Current course enrollment
 - Gradebook data
 - Assignments data

Large-Scale Deployment

- ITS has the people and infrastructure to deploy a shared service on a large scale
- Architecture
 - Database storage and processing capacity
 - Analytics engine choice and capacity
 - Delivery technology
- Data processing
 - On-demand
 - Periodic (weekly, nightly)
- Access and privacy
 - Data stewardship
- Support
 - Training and help documentation
 - Service Center
- Future upgrades and enhancements
- Initial and ongoing budget and funding

Ongoing Challenges

- Integration of 3rd party tools into the LMS
 - Getting access to usage and content data
- Predictive analysis
 - Analysis of existing data
 - Creation and validation of models
- Managing our footprint in the Analytics space
 - Determine new areas where significant value can be provided
 - Collaborate with researchers in other areas
 - Maintaining level of quality and service
 - Keeping pace with changes in technology

Contact Info

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