MODULE 4: EXPLORING ANALYTICS 2 - DESIGN

STUDENT	Keith Hedges
INSTRUCTOR	Krista Galyen, Ph.D.
COURSE	IS_LT 9466 Learning Analytics
DATE	March 17, 2019

EDUCATIONAL CONTEXT

My pedagogical design facilitates the transition from collaborative to individualized learning experiences. The setting is an architectural structures course in an architectural degree-granting program. The institution is rooted in the liberal arts tradition and located in the Midwest. The students are sophomores. The structures course is the first in a sequence of three courses. The content is module specific that has a theoretical sensibility concerning how buildings resist vertical forces or gravity loads such as weights of materials and people. The course is face-to-face in a classroom with whiteboard instruction. The course is equipped with the Canvas learning management system.

The course includes instructional documents provided by the instructor and learner-generated content prepared by the student. The instructional materials are carefully-crafted handwritten lecture notes (replaces textbook readings), learning objectives, video tutorials, in-class problems (for math problems only), practice exam, practice exam key, formula sheet, and assessed student work. The student work includes solutions to open-ended homework problems and closed-ended, multiple choice, examination problems. Student groups complete the more difficult homework problems collaboratively. The groups of three-to-four students are self-selected amongst their peers. Since the examinations measure individual performance, their values are twice that of the group homework.

QUESTIONS

The problem with student learning is that some students may not fully understand all of the topics within a collaborative assignment as they prepare for the examination. The diagram below distinguishes which course documents are provided during the homework and examination preparation periods (see Figure 1). Analyzing student behavioral data retrieved during these two periods would help answer the fundamental question, (1) "*what students need further assistance when transitioning away from a collaborative learning experience and into an individualized learning experience?*" and the subordinate question, (2) "*what learning objectives are the most difficult to comprehend?*"

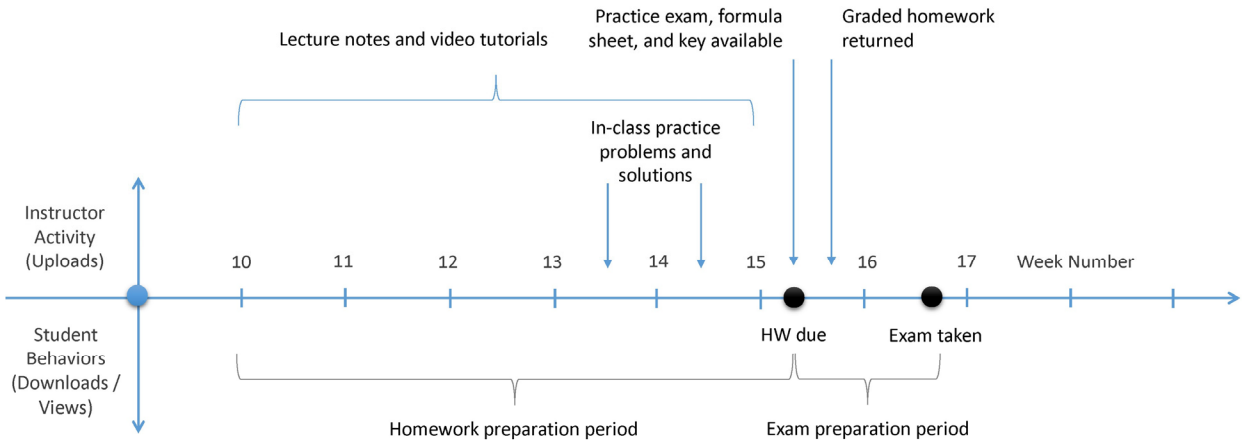


Figure 1. Data sources during homework and examination preparation periods.

Ideal and Non-ideal Visualizations

Visualizations represent the ideal and non-ideal student behaviors in the Canvas learning management system. The viewing of the video tutorials available for each learning objective is the basis for the visualizations. The visualizations rely on a scatter plot illustrating the number of views relative to each learning objective for each student or the class average. The ideal visualization illustrates the number of views for each learning objective by the ideal student (see Figure 2a). The ideal student will view all of the video tutorials at least once during the homework preparation period. The non-ideal visualization expresses the number of views for each learning objective by a lesser performing student (see Figure 2b). The non-ideal student will watch some of the video tutorials during the homework preparation period. The non-ideal visualization will identify which what students need further assistance (Question 1). When the number of views exceeds possibly one, a potential for a too challenging learning objective may exist (Question 2). When the number of views falls below say one, a possibility of the learning objective being too easy, students loafing, or having technological glitches may exist.

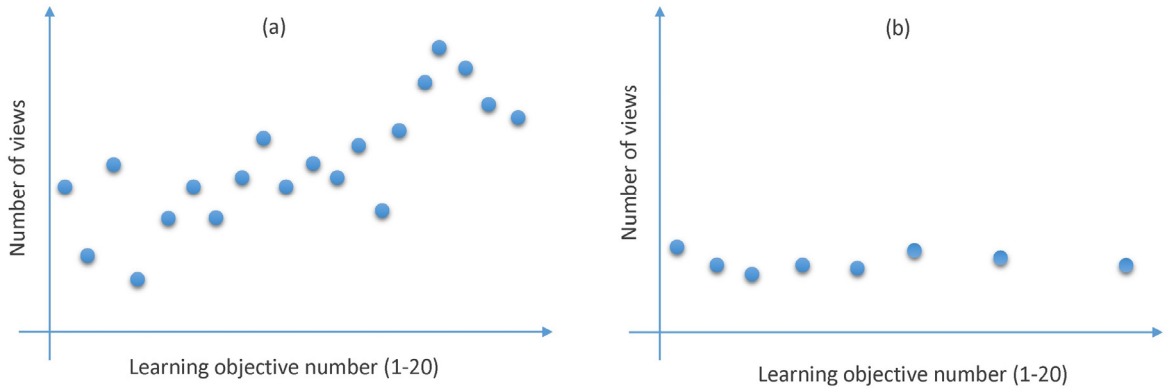


Figure 2. Visualizations: (a) ideal; and (b) non-ideal.

DATA

The primary data are composed of the personal data and the learning analytics data. The personal data are the students' names, provided by the students themselves. The observed data are the number of tutorial views (learner activity data) and the homework and the examination solutions (learner-generated content data). The derived data are the computed total of tutorial views, the total viewing time, the instructor assessed homework and examinations, and their respected computed averages. Figure 3 illustrates the types and classifications of the data embedded in the sample data spreadsheet.

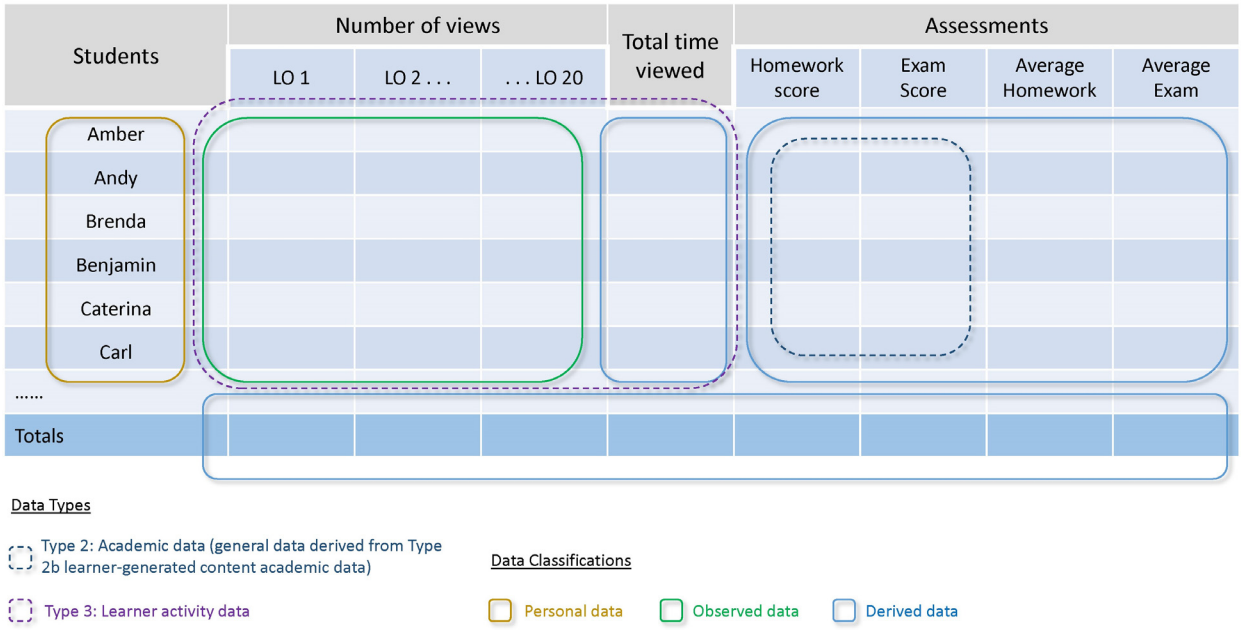


Figure 3. Data types and classifications.

DATA CLEANING

The data will only need a marginal cleaning once the spreadsheet is developed. Referencing Figure 3, two adjustments will be needed for the spreadsheet to function in the Tableau data visualization program. First, the two heading rows must be converted into a single row. The best approach is to delete the 'Number of views' and 'Assessment' headings. Second, rename the 'Totals' row to 'Class' and verify that the row will function the same as a student name. To develop the spreadsheet in Figure 3, I presume that data from two sources might have to be combined into an Excel spreadsheet. The two sources would be the Canvas analytics that may store the number of views and my personal gradebook spreadsheet where I track the course grades.

DASHBOARD

The primary dashboard is a teacher-facing and student-facing that includes three components: performance grid, tutorial viewing bar chart, and a student needs check box list (see Figure 4).

Dashboard design

The design positions the primary image of the 2x2 grid matrix in the upper left corner where the students' eyes normally roam in Western civilizations. The image limits the number of colors to green, yellow, and red, which are conventionally associated with go, yield, stop or warning, respectively. The purpose is to separate completed homework and potential examination performance into four quadrants representing group and individual successes and failures. The low risk students are viewing tutorials during the homework period may achieve group success and individual success (upper right quadrant). The moderate risk students are twofold (1) not viewing tutorials during the homework period may achieve group success and individual failure (upper left quadrant), and (2) viewing tutorials during the homework period may achieve group failure and individual success (lower right quadrant). The high risk students not viewing tutorials during the homework period may achieve group failure and individual failure (lower left quadrant). The secondary image is a comparison bar chart illustrating the class number of tutorial views (or recommended) and the at-risk student number of views. The image is located in the middle of the dashboard. The far right is a student needs checklist to inform the student and teacher what interventions might be appropriate for student success.

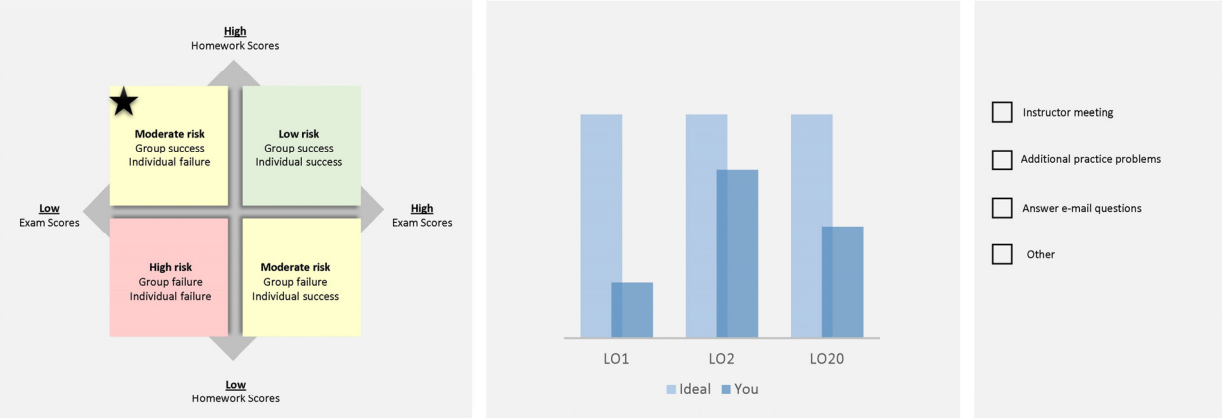


Figure 4. Dashboard.

Timing of notifications

Interventions would occur on three occasions: at the 50% and 75% progress points during the homework period, and at the 25 percent mark of the examination preparation phase once the grades are completed. The learning management system will notify the teacher and student in the form of e-mails with the dashboard image illustrating the type and degree of risk, the tutorial viewing comparison. The student needs check boxes are a prompt to encourage the teacher and student to take action.

Answering the questions

The design identifies which students need further assistance when transitioning away from a collaborative learning experience and into an individualized learning experience (Question 1) and illustrates what learning objectives are the most difficult to comprehend (Question 2).

Forum feedback from peers

- One student commented, “if students are viewing the tutorials, then perhaps there is room for modification of the content or another intervention that would help the student improve”. I now offer different learning opportunities in the e-mail communication such as check boxes for student needs such as one-on-one instructor meeting, additional example problems, etc.
- Another student wrote, “you may want to consider additional data about student-video interaction like watch time (in minutes) ”. I addressed this by added a column in the data spreadsheet to account for the total viewing time. This reveals itself in the dashboard.
- A third student noted, “you would want to see performance curve to know does the views really matter in order to reach the goal”. I added a performance matrix to the dashboard related number of views to performance success. This is a static image independent of data.

Frustrations and difficulties

After reflecting on the design, I noticed some concerns with the process that will have to be addressed. (1) In module 1 of the course, I did not make the group submittal a required. At least three-fourths of the class worked in groups while others chose to complete the homework individually. I will have to think about how individual completion of homework may slant the number views in a positive direction. (2) The course primarily relies on a departmental server to share the course files such as the lecture notes, learning objectives, tutorials, etc. I do upload to Canvas as well. Going forward, I would have to abandon the departmental server. (3) I have zero experience using any of the Canvas analytics. I can upload and create course folders and subfolders, but have never used the grade system or tracked any of the student activities. (4) My accessibility and availability is very high. My office is adjacent to the studios so I see all students daily. Therefore, some data will never go into Canvas.

AREA OF EMPHASIS

The emphasis is design interventions and the key area is adaptive learning. I teach the structures sequence to the architectural students at Drury University, which frames the emphasis area. I will make the IL_LT 9466 class have a direct impact on my current teaching. I intend to incorporate the design into my ARCH 234 Structures I class this spring. We are beginning the second module shortly as shown in Figure 1. To make this happen, I will address the aforementioned challenges in the paragraph above. My goal is to somehow upload all of the files exclusively into the Canvas system at the appropriate times, have the students go about their education normally, somehow find a way to access the Canvas analytics, and intervene before the Drury semester is over. I will use the Mizzou spring break to learn more about Canvas and their analytics. I am guessing that the dashboard is something I will have to custom craft and e-mail directly to the students rather than canvas doing that type of work. Some much still to learn!

MODULE 5: LEARNING ANALYTICS PROJECT PROPOSAL

STUDENT	Keith Hedges
INSTRUCTOR	Krista Galyen, Ph.D.
COURSE	IS_LT 9466 Learning Analytics
DATE	April 7, 2019

PROJECT DESCRIPTION AND KEY QUESTION

I am concerned with student learning as they transition from group related homework activity into individual examination preparation. Some students may not have fully participated and understood all of the topics within a collaborative assignment as they prepare for the examination. The fundamental question is (1) "*what students need further assistance when transitioning away from a collaborative learning experience and into an individualized learning experience?*" and the subordinate question, (2) "*what learning objectives are the most difficult to comprehend?*" The purpose is to develop a predictive intervention strategy that identifies the at-risk learners and offers further learning opportunities surrounding the difficult learning objectives. The viewing of video tutorials available for each learning objective is the basis for the intervention.

DATA PARTNER AND PLAN

The setting is learning module in an architectural structures course in an architectural degree-granting program in higher education, at Drury University. The content concerns how buildings resist vertical forces or gravity loads such as weights of materials and people, and the stresses and forces imposed on beams and columns. The course is face-to-face in a classroom with whiteboard instruction. The course is equipped with the *Moodle* learning management system. Moodle is one of two dissemination vehicles used for course content such as lecture notes, tables and figures, learning objectives, etc.

The primary data are the students, number of accesses to learning objectives, number of tutorial views or downloads, number of lecture note views or downloads, and average homework scores. The data will come from two sources, *Moodle* and myself. *Moodle* will deliver everything except the average homework score. I will anonymize the student names with numbers. The timeline follows:

- Collaborative Phase, March 26 – April 30 (students view tutorials, download documents)
- Intervention **1** date at 75%, April 18-ish, Instructor will run the data and identify and contact at–risk students (use this data for the M6 assignment due April 21)

- Homework due date, April 30
- Intervention **2** date, May 2-ish, Instructor will run the data and identify and contact at–risk students (use this data to create visualization for M7 assignment due May 5)
- Individual Exam Prep Phase, April 30 – May 10-ish
- Examination, somewhere between May 6 and 10
- Module 8 due date, May 15

Chosen Area of Emphasis

The emphasis is design interventions and the key area is adaptive learning. I teach the structures sequence to the architectural students at Drury University, which frames the emphasis area. I went into teaching because I enjoy helping people learn. Being there when the students have a Eureka moment is amazing. With modern technology, I may no longer be physically present, but the data analytics garnered through the IL_ST 9466 class can positively affect my student's learning right now!

Data or Analytic Sample

The *Moodle* data is available for download in .xlsx and .csv formats. I will create a new .xlsx table similar to the one below, which will merge the Moodle data and my grade data. The table is currently untidy to better illustrate the field content. I will remove the student names and replace with numbers, remove one heading row. The total viewing time may not be available in Moodle, which may later be replaced with the learning objective and or lecture notes downloads.

Students	Number of tutorial views			Total time viewed	Assessments	
	LO 1	LO 2 . . .	. . . LO 20		Homework score	Class homework average
Amber						
Andy						
Brenda						
Benjamin						
Caterina						
Carl						
.....						
Totals						

Planned Approach

The approach is to find the students that might be at-risk of poor performance in advance of their examination and to contact them and to offer assistance.

(1) W*hat students need further assistance when transitioning away from a collaborative learning experience and into an individualized learning experience?*

The data will reveal whether the student is engaging in viewing the instructional video tutorials. A student that is not viewing videos may be having technical glitches, fully understands the content, or is disengaged from the class. A student that is viewing the tutorials frequently may be engaged in the class, but is not understanding the content; or might be in a learning environment that has many disruptions, etc. My initial hypothesis is that the students that are not viewing the videos are most likely to be at-risk. My goal is to identify the sweet spot for each student with regard to what is the appropriate amount of viewing for their success.

(2) W*hat learning objectives are the most difficult to comprehend?*"

My initial hypothesis is that the highest number of tutorial views for a learning objective will reveal the most difficult content. This content could be further described in a preparatory lecture.

Audience

The audience is the students in one of my architectural structures courses at Drury University. Since, the students are about 20 years old; they are very fluent with digital technology and are multi-taskers. I created the video tutorials for their generation, because some may tune out an in-person lecture. I am probably not as exciting as the internet or whatever they are searching for these days. The video tutorial is available remotely 24/7 from anywhere they have internet access. The video tutorials are screen captures of my drawing on my lectures notes while explaining the content.

Concerns (if any) and Next Steps

My biggest concern is my lack of experience with Moodle. I found that I can download table data in .xlsx and .csv formats. When viewing the spreadsheet, I must change how I upload my documents. I have the tutorials embedded within folders. *Moodle* tracks files, but not when they are embedded. Therefore, every tutorial has to be its own folder to read as an individual file. I also found that *Moodle* will track when the file is viewed and by which student, but may not document the amount of viewing time. There will also be significant data cleaning as I merge into a single file for use with Tableau. I think Drury should have a resident *Moodle* expert so I should be able to figure things out. I just need to do some hands-on practicing.

The next step is to upload the content to *Moodle* in a manner that will collect the data in a way I can clean the dirty data. I have four classes that can use *Moodle* so I may rehearse uploading in other sections and practice the data collection. I have the content finished; I just need to upload correctly.

MODULE 6: LEARNING ANALYTICS FINAL PROJECT PART 1 - DATA PREP

STUDENT	Keith Hedges
INSTRUCTOR	Krista Galyen, Ph.D.
COURSE	IS_LT 9466 Learning Analytics
DATE	April 21, 2019

TITLE

Using analytics to identify at-risk students transitioning from collaborative to individualized learning experiences

OVERVIEW

The emphasis is design interventions and the key area is adaptive learning. The audience is the architectural students in my first structures course in a traditional classroom setting at Drury University. The analytics are teacher-facing through the *Moodle* learning management system used for file sharing. The purpose is to develop learning analytics to identify at-risk learners and to facilitate communications between the teacher and the students. The potential actions by the instructor might be offering further learning opportunities surrounding specific learning objectives. The key questions are (1) "*what students need further assistance when transitioning away from a collaborative learning experience and into an individualized learning experience?*" and the subordinate question, (2) "*what learning objectives are the most difficult to comprehend?*" The analytics will help identify which students might be struggling based on their online behaviors regarding the viewing of video tutorials for each learning objectives.

DESCRIBING COLLECTION, ACQUISITION, AND STORAGE OF DATA

The data is the online behaviors associated with viewing video tutorials. The instructor provides a tutorial for each learning objective where each objective connects to a closed-ended homework problem and open-ended examination problem. The students access the *Moodle* LMS to read the learning objectives and to view the associated explanatory videos and figures, tables, or problems. *Moodle* collects the online viewing activities for each student. *Moodle* collates the data into an accessible comma separated value file (.csv) and (Excel (.xlsx) files. The instructor acquires the files by downloading through a password protected university computer and a password protected *Moodle* course folder. The data is confidential at this point, but is not yet anonymized as the student names are in the files. The instructor stores the files on a password-protected computer and manually password protects the .xlsx file. The data collection, acquisition, and storage are password protected throughout the entire process.

Understanding the Raw *Moodle* Dataset

The table below categorizes the data as noise or signals according to the *Moodle* .csv file. My comments for cleaning the data are on the far right column. Some variables will be kept or deleted in their entirety, while other might be filtered later in the process. If the data is not connected to one of the research questions, it will most likely be deleted unless it has a redundancy, or a descriptive value. The data is sufficient to answer the questions.

Variables	Relevant data	Question	Instructor action
Time	Noise	-	Delete entire column after deleting rows prior to April 7, 2019
User full name	Signals and noise	1	Delete all rows with instructor's name, keep all student rows
Affected user	Noise	-	Delete entire column
Event context	Signals	2	Keep all rows. The rows identify which learning objective and tutorial was viewed.
Component	Signals and noise	2	Keep all rows with 'File'. This will permit easier sorting later in Excel; delete all other rows
Event name	Noise (but keep some of it anyway)	-	Keep all rows with 'Course module viewed'. This indicates that the student viewed the resource activity. Delete all other rows.
Description	Noise	-	Delete entire column, although this is good information such as "The user with id '7165' viewed the 'resource' activity with the course module id '604768'. This validates the event name.
Origin	Noise	-	Delete entire column
IP Address*	Noise	-	Delete entire column. *This column was removed from the raw data Excel file to protect the students' privacy.

Data Cleaning Subcycle - Refining Your Questions and Plan

The questions do not need refinement, but the definitions described in the aforementioned table do influence how the instructor might interpret the questions. The questions are (1) "*what students need further assistance when transitioning away from a collaborative learning experience and into an individualized learning experience?*" and the subordinate question, (2) "*what learning objectives are the most difficult to comprehend?*" For example, the basis for the questions is the behavioral data associated on whether the students are viewing the video tutorials. The data does not provide any evidence that they viewed the tutorial. The data shows that the students clicked on the location where the embedded MP4 video files are located. The viewing activity is still relevant, but should be conflated to the actual viewing and understanding of the video content. In hindsight for next fall, I should include check boxes such as 'I viewed the tutorial and I (do not) understand the learning objective.' This would relay more direct and accurate learning information to the teacher.

Data Cleaning Subcycle - Steps for Wrangling

The data was cleaned and tidied according to the three principles where (1) the student names (observations) are placed in rows, (2) the 2-0 learning objectives (variables) are placed in columns, where (3) each observational unit forms a table.

Clean data 1

- Deleted 'Time' column
- Changed the title of 'user full name column' to 'Student'
- Deleted 'Affected user' column
- Sort and filter the spreadsheet according to 'Event name'
- Delete all rows except for the original title row and the rows with the event name 'Course module viewed'
- Relocate original title row to the top
- Remove all rows with the instructor's name
- Delete the 'Description' column
- Delete the 'Origin' column
- Delete the 'IP Address' column
- Delete all rows except for the original title row and the rows with the Component 'File'
- Delete all rows in the Event context that do not have a learning objective number
- Sort and filter the Event context [notice how Excel alphabetizes from 1 to 10, 11, then 2, 3, etc.]

Clean data 2

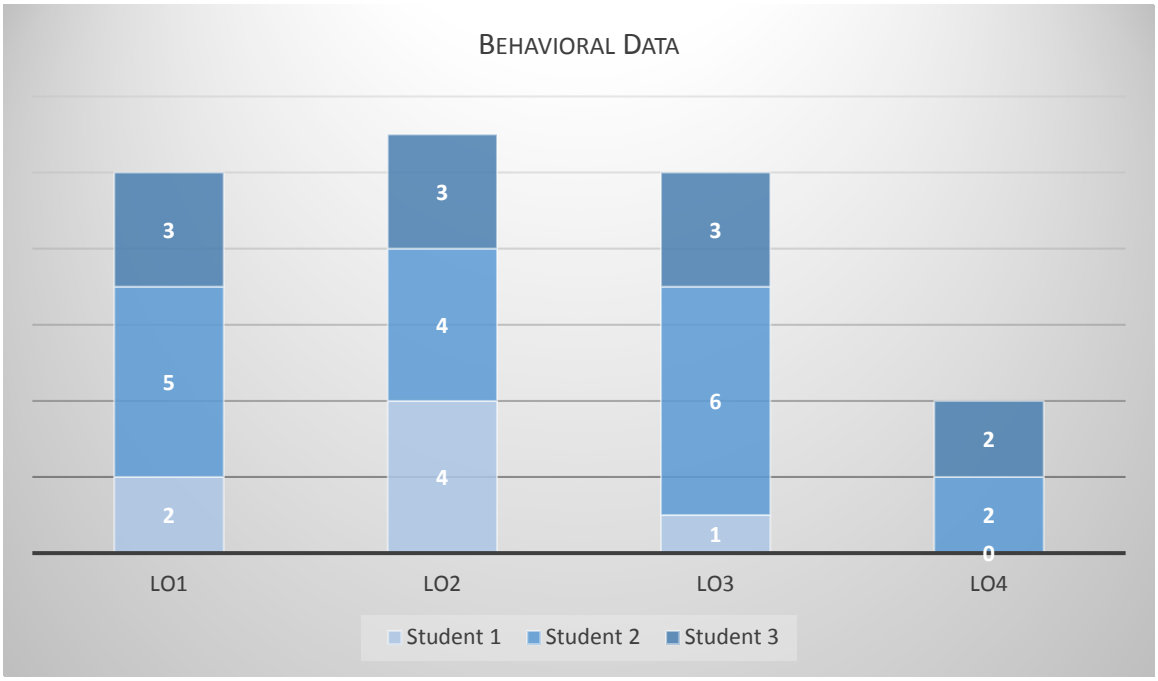
- Create new sheet at bottom of Spreadsheet
- Create new first row heading with 'Student Name, 1, 2, 3, 4, 5, [to], 20' for each learning objective
- Insert the student's names alphabetically and remove their last names
- Transpose the rows and columns – This is where the table becomes unwieldy and the instructor has to manually add the number of clicks and insert into the table.
- Add a summation at the bottom to identify the total number of clicks on the video tutorials

Reflecting on Ethics

Overall, I do not have any major concerns regarding ethics, but have a couple of minor considerations. The big picture of finding and aiding potential at-risk students seems to be an appropriate activity for an instructor. After navigating through the data wrangling, I am concerned about insufficient data (Sclater, 2017, p. 207). To answer the questions, I am relying on a single data resource, the online behaviors of clicking on video content. I am making an assumption about students being at-risk without multiple data points such as past homework and exam performance, current course grade, etc. I do not have concerns about privacy as all documents have at least one layer of password protection if not more.

Simple Design Plan

The data will be imported into Tableau where a correlational analysis will occur between the student actions and the learning objectives. The visualization would be stacked bars with the learning objectives on the horizontal axis and the student number of video clicks on the vertical axis. There are 20 learning objectives in the module and anywhere from 16 to 25 students depending on which section I select. I have no idea what the data might reveal, I am just hoping that the students begin viewing the tutorials. They have a major studio project due next week that has been absorbing most of their energy.



MODULE 7: LEARNING ANALYTICS PROJECT STEP 2 - ANALYZE

STUDENT	Keith Hedges
INSTRUCTOR	Krista Galyen, Ph.D.
COURSE	IS_LT 9466 Learning Analytics
DATE	May 5, 2019

TITLE

Using analytics to identify at-risk students transitioning from collaborative to individualized learning experiences

OVERVIEW

The emphasis is design interventions and the key area is adaptive learning. The audience is the architectural students in my first structures course in a traditional classroom setting at Drury University. The analytics are teacher-facing through the *Moodle* learning management system used for file sharing. The purpose is to develop learning analytics to identify at-risk learners and to facilitate communications between the teacher and the students. The potential actions by the instructor might be offering further learning opportunities surrounding specific learning objectives. The key questions are (1) "*what students need further assistance when transitioning away from a collaborative learning experience and into an individualized learning experience?*" and the subordinate question, (2) "*what learning objectives are the most difficult to comprehend?*" The analytics will help identify which students might be struggling based on their online behaviors regarding the viewing of video tutorials for each learning objectives.

DESCRIBING THE DATASET

The data is the online behaviors associated with clicking the buttons to activate the video tutorials for each learning objective. The data spreadsheet includes the (1) names of the students (anonymized), (2) the names of the video tutorials, and (3) the number of video activations (mouse clicks). The student names assist with identifying which students may or may not need assistance. The names of the tutorials facilitate sorting the data for each individual learning objective. The numbers of activations recognize the number of mouse clicks.

REFINING THE QUESTIONS

The questions do not need refinement, and can be answered through the proper interpretation of the dataset.

Steps for Exploration and Analysis

Descriptive statistics were deployed to reduce the data into simpler indicators to represent characteristics of the distribution. For example, I want to know:

Basic indicators as totals

- The total number of video activations for the class
- The average number of video activations for each student

Basic indicators illustrate the volume of viewing traffic for the class. These are numerical totals.

Patterns and trends for students and learning objectives

- The number activations for each student
- The number activations for each learning objective

The patterns identify the activities at the student and learning objective level. These are simple bar charts.

Details contextualizing students and learning objectives

- The students not activating the most frequented tutorials

Identify the at-risk students by filtering the data in this manner through Tableau.

The fundamental idea was to slowly uncomplicated the large volume of data from the .csv file into a manageable means of identify what students might not be viewing the tutorials. The data does not formally reveal that they are truly at-risk, as they may understand the content during class. The premise is: if the students are not viewing the most frequented learning objectives, they are more likely to have fewer learning repetitions. Fewer learning repetitions are more likely to place a student at-risk. As a result, of the data exploration, my questions still have not changed at this point. I did learn that the learning objective for Dead Loads was not that difficult, rather I needed to provide more explanation of what is meant by unit weight when they were completing the homework table. The topic of tributary areas which had the same tutorial views, was difficult for the students and I used class time to further explain. Therefore, the number of views could either be due to difficulty with content or interpreting the instructor intent.

I did experiment with other data interpretations. I was curious about the means and the mode of viewing, and the relationships within the group submittals, but that was overly too complex to filter out. In the future, I may be compelled to share the files in Moodle within groups as to better track some of the online behaviors.

Communication Dashboard

The following page is an infographic of the data. I followed the concepts of the upside-down triangle where the indicators preceded the trends, and the details were positioned last. The graphic would look cleaner if I had fewer students and learning objectives, but I started with a few thousand rows of data and tidied to 318 rows.

The five bullets above are illustrated in the infographic: (1) total number of video activations for the class; (2) The average number of video activations for each student; (3) The number activations for each student; (4) The number activations for each learning objective; and (5) The students not activating the most frequented tutorials.

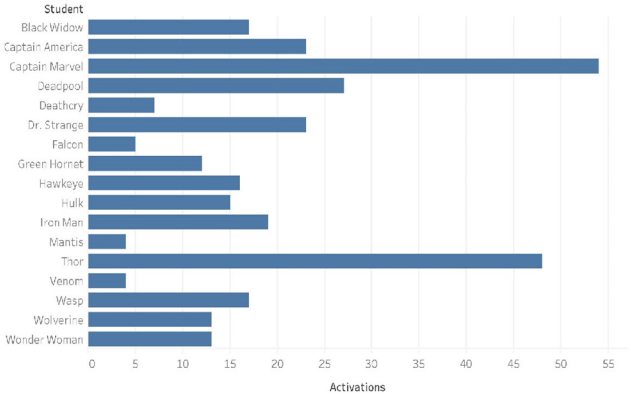
Tutorial Views

317 Views

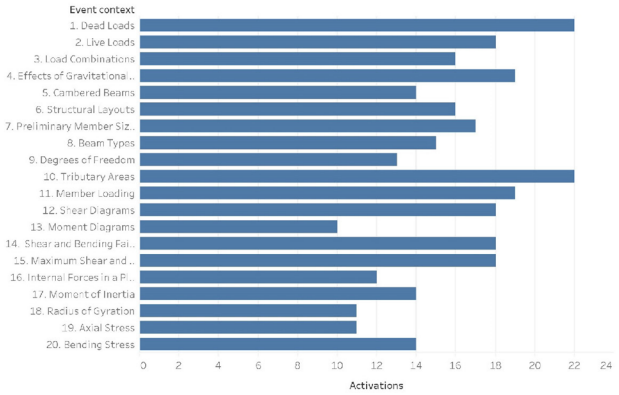
the total number of video activations for the class

19 Views

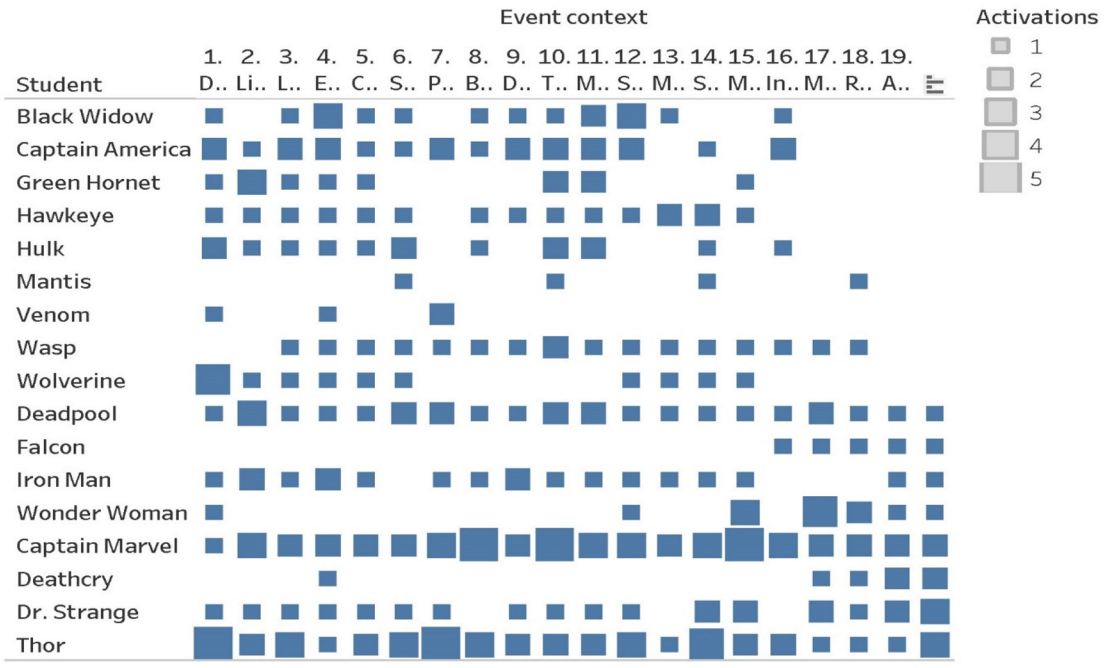
the average number of video activations for each student



The total number of video activations for each student



The total number of video activations for each learning objective



The frequency of activations for each student and each learning objective.

Reflecting on Ethics

Overall, I do not have any major concerns regarding ethics. The students are all college-aged adults. All data is password protected and student names are anonymized through code names. The data is not shared outside of the classroom and is kept confidential. Any student interventions resulting from a data analysis would be to enhance student performance.

Visualization Files

I am uploading three files: (1) The tidy .xlsx spreadsheet; (2) The Tableau file in .twbx format; and the infographic .pdf that I made in PowerPoint.

Module 8: Learning Analytics Final Submission: Client-Facing Summary

Student	Keith Hedges	Instructor	Krista Galyen, Ph.D.
		Course	IS_LT 9466 Learning Analytics
		Date	May 15, 2019

Title

Using analytics to identify at-risk students and uncertain content when transitioning from collaborative to individualized learning experiences

Overview

The emphasis is design interventions and the key area is adaptive learning. The setting is an architectural structures course in a traditional classroom at Drury University. The analytics are teacher-facing through the *Moodle* learning management system (LMS) used for file sharing. The purpose is to develop learning analytics to identify at-risk learners and suspect content to facilitate subsequent communications between the teacher and the students. The potential actions by the instructor might be offering further learning opportunities surrounding specific learning objectives. The key questions are (1) "*what students need further assistance when transitioning away from a collaborative learning experience and into an individualized learning experience?*" and the subordinate question, (2) "*what learning objectives are the most difficult to comprehend?*" The analytics will help identify which students might be struggling based on their online behaviors regarding the viewing of video tutorials for each learning objective.

Data and Analysis

The data is the online clicks used to activate the video tutorial assigned to each learning objective. The *Moodle* LMS collected and collated the data. The data includes the comic character code names of the students, the number and name of the video tutorials, and the number of video activations. The data was tidied in Microsoft Excel and visualized in Tableau with horizontal bar charts and a heat map.

Analytics (Conclusion)

The analytics reveal the individual student viewing patterns and relationships between the student actions and the learning objectives. The results in the heat map indicate that potentially at-risk students viewing less than half of the tutorials include the Green Hornet, Mantis, Venom, Wolverine, Falcon, Wonder Woman, and Deathcry. The potentially most challenging learning objectives receiving the most views according to the horizontal bar chart include (1) dead loads and (11) member loading.

Client's (Teacher's) Next Steps

The instructor may offer additional lectures, video tutorials, in-class example problems, take-home problems, etc. associated with the two aforementioned learning objectives for the entire class or for selected students.

Communication Dashboard

See following page.

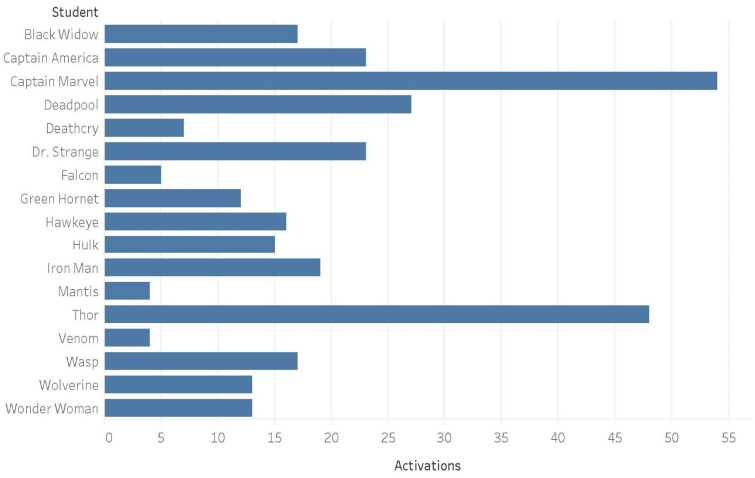
Tutorial Views

317 Views

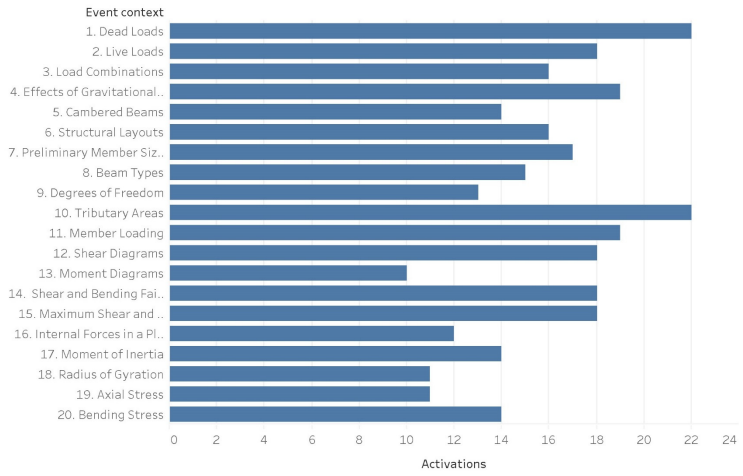
the total number of video activations for the class

19 Views

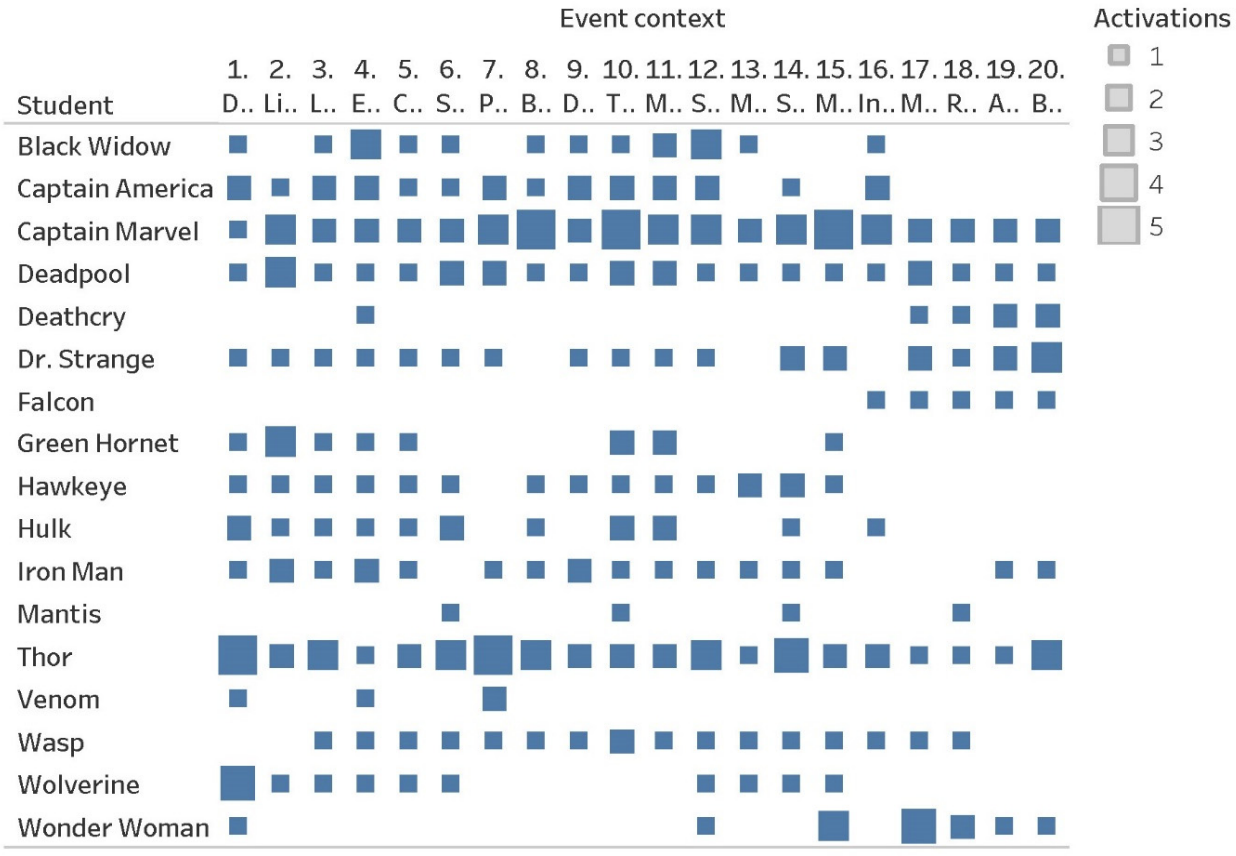
the average number of video activations for each student



The total number of video activations for each student



The total number of video activations for each learning objective



The frequency of activations for each student and each learning objective.