Teaching Case

A Taste of Microsoft Data Analytics in Introductory MIS Curriculum to Encourage Analytics Skills and Knowledge

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Abstract

Big data and analytics continue to grow as the next evolution in business intelligence (BI) that organizations are using to make data driven strategic decision to successfully compete in the business world. Grappling and analyzing the ever-growing volume of data has become a major challenge for organizations. Data visualization techniques are seen as the main solution to deal with this immense data growth. Both globally and locally, organizations are realizing that there is a growing need for skilled professionals who can develop and use visual data analytics for decision making. In order to satisfy demands for analytics skills in the local and global communities, there is need to attract students to analytics programs. The addition of data visual analytics curriculum to an introductory information systems course would give students an interesting hands-on experience with analytics that may prompt them to consider analytics as an option as they develop their program of study in higher education.

Keywords: Analytics Experiential Learning, Data visualization, Power BI, Real world data sets

1. INTRODUCTION

"A picture is worth a thousand data points." This is the mantra among organizations that are collecting, storing, and analyzing massive amounts of data to effectively compete in the marketplace. The increase in the collection of data, characterized by high volume, velocity (i.e., the frequency of incoming data that needs to be processed such as a stock ticker tape), and variability (e.g., twitter feed, images, transaction data, social media), is creating new challenges for organizations to survive but more importantly to succeed. IT teams are burdened with ever-growing requests for data, ad hoc analyses and one-off reports. Decision makers are frustrated as it takes hours or days to get answers to questions. While big data has a lot of potential to gain valuable insights, it can also be a burden. Data visualization can have a significant impact on how organizations can gain insight from its data.

Data visualization is the presentation of data in a pictorial or graphical format. Using charts or graphs to visualize large amounts of complex data is easier than pouring over spreadsheets or reports because of the way the human brain processes information. Data visualization is a quick, easy way to convey concepts in a universal manner. With interactive visualization, decision makers can take the concept a step further by using technology to drill down into charts and graphs for more detail. Consequently, data visualization is becoming a crucial component of advanced analytics in the age of big data.

This assignment proposes to give freshman and sophomore students in the required introduction to information systems course an opportunity to experience data analytics using a data visualization tool. This would enable students to get a 'taste' for data analytics and consider further exploring data analytics as a subject of interest as well as a future career option during their college career. First this paper presents

potential instructors with more information on the importance of analytics to education as motivation to consider using this curriculum in the classroom. Next it describes the data visualization project that was used in the classroom along with other resources that would be beneficial to help an instructor adopt this project such as a grading rubric and sample student presentations. The author had success in encouraging students, who had not previously considered analytics as an option, to add analytics as a major, minor in to their program of study as well as pursue more analytics related course work. This work is described with hope that other faculty will have be able to replicate this success in the class room.

2. THE DEMAND FOR AND PERCEPTION OF ANALYTICS CURRICULUM

By increasing visualizations, organizations can make data driven decisions more effectively and efficiently. The use of visualizations increases the functionality of decision makers as they are able to ask better questions from the data. It creates linkages between data points that seemingly do not have links. It creates higher data quality as analysts can locate the good and the bad data. This leads organizations to maximize their productivity as well as increase the value of the information they collected.

As a result, as the demand for big data continues to grow, the need for expertise in data visualization has begun to increase (Bhatia 2019, Hale 2018). Data visualization skills was one of the top ten technical skills with the highest increase in demand according to a study commissioned by Baylor University (Kauflin 2017). Data analysts who are able to utilize various data visualization analytics techniques to analyze data have become extremely high demand roles in the industry. Nationally the shortage of people with analytical skills is continuing to grow (Holak 2019, LinkedIn Workforce Report 2018). Locally, companies in the area as well as students (especially MBA students) who are aware of the analytics trend are requesting more content and programs on analytics, big data and data visualization skills. In response to these requests, local higher education institutions are creating courses in advanced analytics, using real world data sets for course projects, and developing programs in analytics for graduate and undergraduate students.

However, the majority of students in liberal arts higher education institutions often do not comprehend the meaning of 'analytics.' As most analytics curriculum is offered through IS/IT related departments, they equate it with programming. It is often difficult to dispel this myth (Gandomi 2015). Equally, parents of incoming students hesitate to direct students to undergraduate programs that have an analytics focus in fear of heavy statistics in the curriculum (Holsapple, Lee-Post & Pakath 2014). Dissipating these misnomers are challenging. Attracting students to explore analytics as an option, educating students to see the broad spectrum of possibilities in analytics that range in skills and knowledge needed is problematic as existing courses leave little room for the addition of new content.

3. MICROSOFT ANALYTICS PROJECT IN THE INTRODUCTORY MIS COURSE

Data visualization skills are the latest high demand skill requirement in the big data and analytics space (Bhatia 2019, Hale 2018). To introduce the concepts of data analytics early to college students, a data visualization based real world data assignment was introduced to freshman and sophomore students who take the required Introduction to Management Information Systems course. Typically this course focuses on Microsoft Office applications as well as giving students an overview of information systems concepts.

While teaching hands-on skills with MS Access and MS Excel, the students were exposed to pivoting, integrating different data sets and then finally introduced to Microsoft Power BI. Students were given the choice of either using the Power BI cloud service or the desktop version to conduct more visual analyses on a data set. Finally over the course of the semester, students were asked to complete milestones towards the accomplishment of a final project.

They used MS Excel, MS Access as well as MS Power BI to complete the project. Students were pleasantly surprised at how they could visualize and chart data to get a general overview of the data. Then most of them drilled deeper into the data to understand nuances. Their explanations were often well thought out for the results that they gained and some spent painstaking time to prepare the data, analyze the data and develop visuals that were pleasing and effective. Many walked away with confidence and a feeling that "data analysis is not soo bad (quote from one student)." Another student, a human resources major, approached me after class to state that she had shared her experience at an interview and the employer had been very interested in her final project. No negative student feedback has been recorded either in person or through

anonymous survey. Many students have since started taking other analytics courses leading to the addition of Analytics as a double major or minor. Employers in the local area are excited at the potential of incorporating analytics early in students' academic career. It provides them a sense of what self-service analytics and knowledge work in the future may look like.

Integrating Microsoft Power BI and data visualization through a real world project into the introductory information systems course has been a successful venture so far. The total class time and prep work required has been minimal. Through the project students have been exposed to data visualization techniques and the principles for visualization. Students gained hands-on exposure to a data visualization application that gave them a taste of what analytics may involve. By engaging in the assignment, students are exposed to analytics through data visualization based experiential learning that can become a great means of attracting students to analytics programs.

4. LESSON PLAN

When possible, all relevant teaching content has been provided in the Appendix (Please note, the number item described below is used to locate content included in the Appendix). Others are attached with this submission.

1. Present the Final Project description on the first day of the course at the beginning of the semester as something students need to work on as part of the course (Included in Appendix)

2. Teach existing course lessons on introducing and working with Excel Pivoting (Content not included here)

3. Assign the Article on Data Visualization ahead of class. Review examples of data visualization in class with students - https://blog.hubspot.com/marketing/great-data-visualization-examples#sm.0000j2cg9qcqhehjx7m24aw8fgzf3

(This article very simply explains what data visualization is as well as provides some interesting and fun visualizations related to sports, current affairs, famous people, etc… that would be interesting to students)

4. Assign students to complete the Power BI tutorial – (Included in Appendix)

5. Suggest and help students identify a good data set for analysis. Students are encouraged and given personal attention to identify a data set that is relevant to their major or chosen career. This enhances their interest in completing the assignment with greater enthusiasm and interest.

6. Final project presentations (Presentation guide – slides attached; Rubric – included in Appendix)

7. Sample presentation slides that you can share with students to give them ideas of what they could do (Attached to this submission)Data visualization skills are the latest high demand skill requirement in the big data and analytics space (Bhatia 2019, Hale 2018). To introduce the concepts of data analytics early to college students, a data visualization based real world data assignment was introduced to freshman and sophomore students who take the required Introduction to Management Information Systems course. Typically this course focuses on Microsoft Office applications as well as giving students an overview of information systems concepts.

5. CONCLUSION

Analytics continues to grow as an area of major importance to industry that has a significant skills shortage. This paper describes a project that could help student self-select themselves to analytics based programs and curriculums by giving them an opportunity to experience analytics hands-on in one of the first information systems courses they take as undergraduates. By creating an opportunity to engage in a data analytics project where students work with real world data, students gain an understanding of what a role in data analytics might entail. In so doing, the project gives instructors the ability to engage students in analytics early in their college career. Use of the project described in the paper in courses six times have proven that it can have an impact on student perception of data analytics.

5. REFERENCES

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Appendix

1. Final Project Description

The ability to collect a data set, analyze, gain insights and communicate results in a manner that is powerful to a business client requesting business insights are a key set of skills that employers are currently demanding. Through this individual project, each of you will practice these skills by taking a real world data set and taking it through the different steps listed below. Your grade will be based on the complexity of the analysis provided, the discoveries you make and the story you develop to communicate your analysis
In this project, first you will choose a real world data set (Excel based) and analyze it to find interesting links and trends. Here are a couple of possible sources: data set list 1, data set list 2. You are free to use another source if you wish.

IMPORTANT - CHOOSE your data set wisely:
1. Make sure the Excel data set has at least 300 rows.
2. Examine and make sure you have interesting columns provided that can be used for analysis.(i.e., 5-8 descriptive variables/dimensions such as gender, product categories, location AND 2 or more numeric measures such as income, sales revenue). Make sure that 'time' is one of the variables you have in the data set. List the descriptive and numeric variables in your dataset. Selections will be awarded on a first come basis.
3. Identify 3-5 major questions you plan to investigate using the data set. I realize these may change as you analyze. However, make sure that you have 3-5 broad questions. Submit your questions along with your dataset.
4. Analyze the data using MS Excel, MS Access, Power BI and any other tools you choose. NOTE - Choosing a good data set is critical as it will drive the analysis you can do. Your grade will be based on the complexity of the analysis provided, the discoveries you make and the story you develop to communicate your analysis.
5. Present your findings at the end of the semester to the entire class.

4. Power BI Tutorial

In order to learn the basics on Power BI, please do the following:

1. Read the section on Building Blocks of Power BI to become familiar with the basic areas of this analysis tool.

2. Use the data set on financial data and follow this very short video to create a two paged report using Power BI desktop (available the lab). Note that the presenter goes through the video at a fast pace. You may need to slow it down to create the two page report. You can try to use the Power BI online version if you like.
Save your report with your name on it and submit to Canvas.

3. Watch the following tutorials found in this guided learning link to become familiar with various types of visualization which you can use to analyze data. This is help you better analyze your final individual project data set.

1. Visualizations 2m
2. Create and Customize Simple Visualizations 8m
3. How to Use Combination Charts 5m
4. Create and format slicers 7m
5. How to Use Map Visualizations 11m
6. How to Use Tables and Matrixes 8m
7. How to Use Scatter Charts 9m
8. How to Use Waterfall and Funnel Charts 5m
9. How to Use Gauges and Single Number Cards 7m
10. How to modify colors in charts and visuals 5m

6. **Final Project Presentation Rubric**

Name _____

Presentation_____/50 Total Points

The presentation is a critical part of this project. It should be conducted professionally and should present a story surrounding the data context and the analysis.

The presentation should be 5 minutes long. You need to address why you chose the project, the need for data analysis, the analysis conducted & discoveries made and conclude by making recommendations, discussing unique insights or future direction. Make sure you tie it back to business, society or individuals that the data impacts.

	Strongly Disagree				Strongly Agree
The presentation was well organized.	1	2	3	4	5
Visual aids were well designed and used effectively.	1	2	3	4	5
The speaker had good presentation skills.	1	2	3	4	5

The presentation effectively described the background and relevant research questions for analysis 1 2 3 4 5

Effectively described the data analysis using techniques discussed in class 1 3 5 8 10

Effectively communicated the story behind the data analysis project 1 3 5 8 10

Concluded with recommendations, unique insights gained and/or future analysis options for your project. 1 3 5 8 10