

Selecting the Appropriate Software for Teaching Visualization in Business Schools

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The digitalisation of organisations has transformed the way organisations view data. All employees are expected to be data literate and managers are expected to make data-driven decisions [1]. Data Literacy can be defined as the “ability to read, write and communicate data in context, including an understanding of data sources and constructs, analytical methods and techniques applied, and the ability to describe the use-case application and resulting value” [2]. The ability to analyse and visualize the data is a crucial skill set expected from every decision-maker. To help managers develop the skill of data visualization, business schools across the world offer courses in data visualization. From an educator’s perspective, one key decision that he/she must take while designing a visualization course for management students is the software tool to use in the course. Existing literature on data visualization in the scientific community is primarily focused on tools used by researchers or computer scientists ([3], [4]). In [5] the authors evaluate the landscape of commercially available visual analytics systems. In business-related publications like Harvard Business Review, the focus is more on selecting the right chart or on designing effective visualization ([6], [7]). There is a lack of literature to guide educators in teaching visualization to management students. This article attempts to guide educators teaching visualization to management students on how to select the appropriate software tool for their course.

This article is based on the experience of teaching data visualization courses to thousands of management students over the years. One of the challenges faced in teaching data visualization in business schools is the diversity of skills, knowledge, and experience among the participants. In teaching data visualization courses, I have primarily used Tableau, Power BI, and Qlik Sense. These platforms are selected as according to Gartner Consulting, these three platforms have been leaders in business intelligence and analytics platform [8] for the last 10 years. Figure 1 shows the leading vendors in business intelligence software in 2024 based on implementations in the industry [9]. Power BI, Tableau and D3.js are the top three vendors.

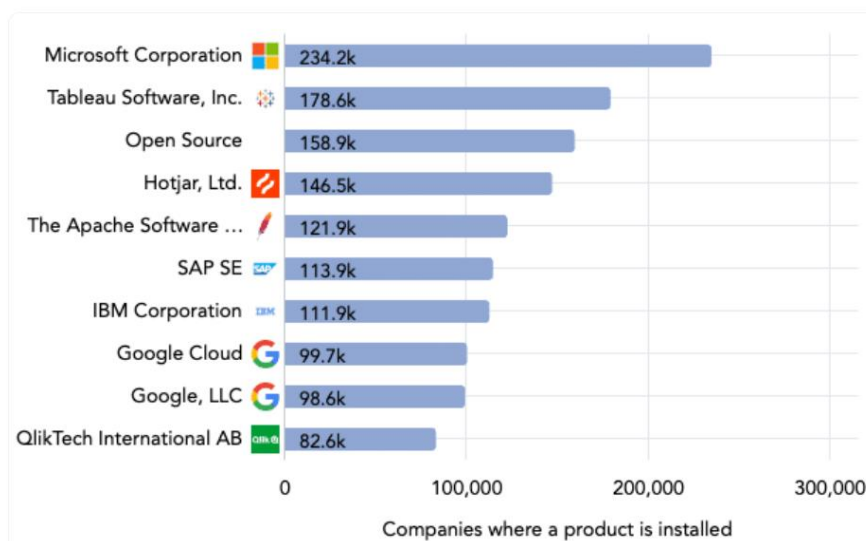


Figure 1: Leading Vendors in BI Market ([9])

While teaching a course, because of a lack of time, an instructor may only select one of the three software platforms. The set of guidelines given below can be used by the educator to decide which platform is their primary tool for teaching visualization.

Ease of Use

Ease of use is defined as the effort or time required to create basic visualizations for a user with no prior knowledge of using visualization software. The software should be intuitive so that the user can easily figure out how to use it with minimal help. This parameter is critical when course participants are not computer savvy. All three leading software i.e., Tableau, Power BI and Qlik Sense score high in this parameter. Among the three, Tableau is more difficult to use as the basic concepts of measure name & measure values, dual axis is not intuitive enough for a user to figure out on their own. Another issue with Tableau is the addition of interactions among charts in a dashboard. In Power BI and Qlik Sense interactions are enabled by default while in Tableau interactions must be enabled manually. In the case of multiple tables in the data set, Tableau's implementation of building relationships between tables is not as intuitive or effective as the other two software.

Platform Access

The platform that provides academic licenses or free access to the full version of the software should be preferred over paid software. In the present landscape of visualization software platforms, there are primarily two ways by which it can be accessed. One way is by installing a desktop application and the other way is accessing the software through the cloud. Cloud is the preferred option as it is not dependent on the operating system and as a result, all students can access the software in the same way. Qlik Sense has only cloud-based access, while Tableau has both cloud and desktop versions. Qlik Sense is a better option as only the cloud version is available, and it is fast and has an intuitive interface. Tableau has both desktop and cloud versions, but its cloud version is not as efficient or data secure as Qlik Sense. Power BI has a few issues with respect to software access. Firstly, the desktop version cannot be installed on Mac laptops. Secondly, the cloud and desktop versions differ in feature set. It is challenging teaching participants when some of them are using the desktop application and the remaining are using the cloud, many concepts shown on the desktop have to be repeated in the cloud as a result class time is wasted.

Variety of Charts

Each platform has a set of charts that are plotted without adding any new add-ons or extensions. Based on the requirements of the course, the platform should be selected. For example, if the course focuses on visualizing data through several types of Maps, then Qlik Sense and Tableau should be preferred. Qlik Sense's approach to maps is easier to understand and has more variety of charts that can easily be created. Power BI map implementation is weak, but it has unique charts like decomposition tree, influence diagrams, ribbon charts etc. that are not to be found on other platforms. Based on the data used the appropriate platform can be selected.

AI Features

Artificial Intelligence features are becoming popular in every software nowadays. Among the top data visualization software, Power BI has the greatest number of AI features like influence diagrams, narrative generation, Q& A. Quick measure that generates code is a powerful feature

that makes Power BI much suited for users who are not adept at writing code. Both Qlik Sense and Power BI have a highly effective tables relationship AI feature that automatically connects multiple tables and creates an entity relationship diagram. Tableau has limited AI features. Senior business managers and non-IT professionals will find AI features beneficial so a platform like Power BI will be more suited for a course designed for them.

Ability to Share & Extensions

The ability to add more types of visualizations in addition to the basic visualizations already available by default is a feature that can be considered while choosing a platform. All software has mechanisms in place to add new visualizations, but the best implementation is in Power BI. Power BI provides hundreds of free and paid charts like Sankey, animated charts, timeline charts etc. that can be easily added. In Tableau and Qlik Sense, the process of adding new visualization is quite complicated.

All visualization platforms now are part of a vendor ecosystem like Salesforce, Microsoft Azure, Amazon services. Cloud services are also a key part of the platform ecosystem. This ecosystem helps in integrating data science features like Auto ML, AI algorithms with the visualization part of the ecosystem. Visualizations help in improving the explainability of the algorithms. The Software platform ecosystem features along with pricing should be evaluated and alignment with the educator course plan should be considered before finalizing a software platform for the visualization course.

Sharing the dashboards and visualization created is also a criterion that can be evaluated. This feature helps with easy submissions of assignments and exams by the course participants. Tableau had the best implementation of this feature. In the case of Tableau public, a user can share their visualization with anyone with an internet connection, Power BI and Qlik do not offer similar features as Tableau public.

Training Resources

Visualization platforms regularly get updated with new features as a result educators and students need to update themselves regularly on how to use these new features even after the initial training is completed. The availability of training materials in the form of courses on platforms like Coursera, Udemy etc. is quite helpful as educators and students can self-learn. In the case of Tableau many books and online courses are available and in Power BI training support is also available to some extent. In Qlik Sense training support in the form of books and online courses is scarce and is primarily limited to the training material uploaded by the platform. Table 1 summarizes the factors discussed for comparing the three software platforms.

Conclusion

In business schools, the focus of a visualization course is more on learning the principles of creative effective visualization and storytelling and not on only learning the software. As management students have varied technical skills and lack programming skills the selection of the appropriate software for the course is quite critical so that the software used in the course should not become a constraint towards learning visualization effectively.

The guidelines described in this report can help educators decide on which software platform to use in their visualization courses. They can evaluate any new software along these parameters to decide on its inclusion in the course.




























	Power BI	Qlik Sense	Tableau	
Ability to Share				■ Excellent ■ Good ■ Poor
AI Enabled Charts				
AI Enabled Data Handling				
Ease of Use				
Extensions				
Map Charts				
Platform access				
Training Resources				
Variety of Basic Charts				

Table 1: Comparison of Tableau, Qlik Sense, and Power Bi across different factors.

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