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Study on data visualization: It's importance in education sector

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Abstract--Data visualization is basically a field that deals with graphical representation of information from raw data. Data visualization tools provide areachable way to see and understand the pattern, outliers and trends in data by using data tools like charts, graphs and maps. It makes decision based on knowing rather than guessing. Large amount of data can be accessible because of Data visualization. Data Visualization also helps in telling stories that highlight trends, pattern, and outliers in organization. Thispaper basically focuses on how data visualization is important in sector of education and also the role of dashboard in improvement of students performance and institutional growth.

Keywords--data visualization, effective tools, storytelling, dashboard.

Introduction

Data visualization is pictorial representation of information. Data visualization tools are help in understanding patterns and trend in data. Sometimes data set become very difficult to understand, Data analysis become complicated, here data visualization come into picture, this is a better way to visualize the data that allows people to understand data easily. The main goal of data visualization is communicate with data and make sense of it and relationship can be expressed

with other data easily. [1]. Visualized data is much faster and easier than text. Human mind may not understand complex statistical model then any data visualization techniques like chart, graphs can be used to visualize data. Data Visualization has become important for every career. It can be used in institute by teachers to display the result of students and can have idea on student's progress. Data visualization Dashboards play a vital role in education sector by giving insight format for taking right decision for institute and students' progress [11]

Why Data Visualization

The purpose of data visualization mostly depends on the requirement and objectives of organization but the main reason of data visualization is to convey information quickly and easily [2]. It provides effective tools which help you to process large amount of data into meaningful format to find data easier to be interpreted when it is translated in graphs and charts. It also provides dashboards to analyze track and display KPIs, it empowers not only technical but non-technical also to understand and influence the intelligence of business for making the decisions more up-to-date. Some example tools are:

Effective Tools& Techniques

As compare to traditional, the new data visualization tools are having improved and advanced features to analyze and interpret the data[5]. Data Visualization is nothing but software that is basically used to convert data into graphical format. It accepts the input in the form of large amount of data and received data is processed and then output is given in graphical form. The graphical output can be charts, graphs or maps [7]. Data visualization is the practice of picturing what you want in future. It is the technique that allows you to set parameters to get future vision in reality.[14]

Data Visualization Tools

- *Tableau*
This tool is mainly used for Data Analysis, Statistical purpose and used by Scientist. Based on data analysis, the process of visualizing data and get clear opinion for future is retrieved. It provides 14 day trail then after will be paid version.
- *Microsoft Power BI*
This tool focuses on creating data-driven business intelligence for today's company. This mainly provides self-service analytical tools used for analyze, aggregate and share meaningful data. This is paid version monthly amount is \$9.99.
- *IBM Cognos Analytics*
It is a Business Intelligence based on Artificial Intelligence for data analysis. Data not only visualized but can be analyzed and actionable insights can be share in the organization. Data also can be shared with multiple users using clouds, mails. It is 30 days trail version then after paid for \$20.87 per month[9].

Data Visualization Techniques

Different visualization techniques are used to present data differently based on several factors depend on organization requirement. Data visualization techniques can be charts, graphs and maps.

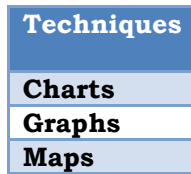


Fig 1. Data Visualization Techniques

Example1 of effective data visualization



Fig 2. Effective Data Visualization

Example2 of effective data visualization

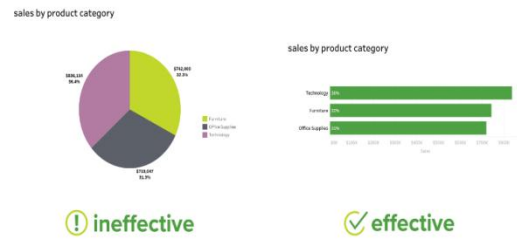


Fig 3. Effective Data Visualization

Key points to make Effective Data Visualization:

- To make it effective, Data visualization need to have clear purpose and audience too.
- Need to choose right type or chart and graph.
- For clarify need to use text and color.
- To differentiate or To compare or To emphasis on important things need to use color.
- Need to avoid ambiguous visualization.
- Keep your visualization as simple as easy.

Example of Students Enrollment Dashboard

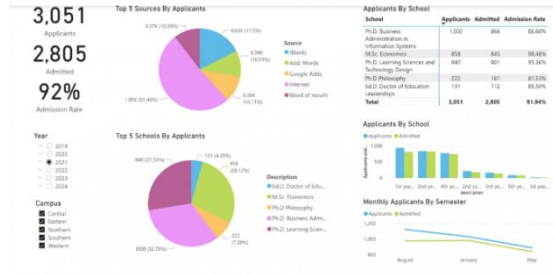


Fig 6. Students Enrollment Dashboard

Storytelling

To manage, To Analyze and extracting information from data storytelling is use, or to address the strategic issue there is a need to apply analytical and critical thinking or mainly, making able to effectively communicate the “story” from data. Using such data visualization techniques, it enables management to tell stories required to push their institution growth, and also ensures long term sustainability of institute. Data Storytelling is builds on foundation of narrative storytelling and its techniques of information visualization which engages the audience and gains their attentions. Main aim of data storytelling is to have communication through the integration of Data, Visual and narratives. Key points for data storytelling [6].

- **Specific Goal**
Data storytelling should be goal oriented, which should enables the data identification that need to be highlighted.
- *Should depend on on appropriate chart type*
As some chart perform better when they work for specific purpose. Like line chart shows changes over time very effectively.
- *Should be reduced to necessary*
Complexity can be avoided by removing unnecessary data and information those are not much informative.
- *Should director attention*
Visual and narrative elements can be used to emphasis key data points to create its data meaningful, this can be achieved by giving the proper color, shape and text.

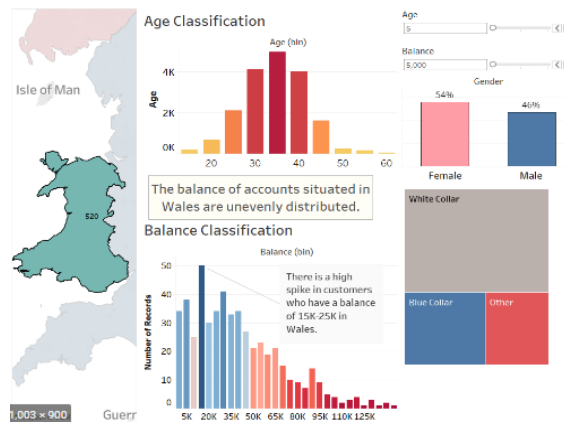


Fig 7. Example of Storytelling Dashboard

It's importance in education

The ability of data visualization is to improve student's engagement and teacher's performance. The element of data visualization help in finding each and every risk also provides opportunity to invest in. It can give to teacher clarity about students need and how quickly decision can be made on the same. In education, every education sector collecting millions of data daily. This data not only can be used to collect and to store but also can create mutual understanding based on intelligence using telling a data story. By Translating, These raw data into visual format, the educator and administrator can able to understand and interpret the trends and pattern easily. If right data visualization board is used, it would be easy to process student's data, and can be start predicting and deciding on what can be done for teachers and students performance. With the ability of advanced tools and techniques smarter strategy can be prepared to future benefits[4].

Improving Data Use in Education using data visualization

- Teacher can look student's performance and can identify the gap between the knowledge and the instruction customized.
- To schedule the class administrator can view enrollments and course taking.
- Board member of organization can ensure the equitable resources across the campus.[13]

Advantages of Data Visualization in Education

Table 1
Advantages

No.	Advantages	Description
1.	Understand and Interpret data easily	Having visual data using charts and graphs trends and pattern can be understood easily.
2.	Large amount of data	This is performed with the use of

	can be processed quickly.	interactive Dashboards
3.	Story can be put in data	Recommendation, consequences can be add in a such a way that convey story to audience.
4.	Analysis Institute performance	Using effective tools & techniques lacking and improvement can be seen.
5.	Real data can be obtained	Big data visualization work in real time, given data is updated continuously.

Summary

- Data Visualization is graphical representation of information that can be interpreted easily for decision making.
- Data Visualization increases the speed of decision making.
- In data error and inaccuracies can be identified quickly.
- It access real time information and also assesses them.
- By using storytelling right message can be convey to audience.
- By applying advanced chart performance and improvement can be seen easily.
- By using Dashboard students as well as institute performance can be analysis.
- It can explore institute insight and can achieve institutional goal in right direction.[11]

Conclusion

By analyzing this study it has been concluded that how data visualization is playing important role in education for analysis, diagnostic, performance improvement of student and institute. Using flexible dashboard data can be displayed from multiple sources including enrollments, assessment scores. Educational professionals are using this data as a benchmark and achieving the set goals. Educational dashboards can be used internally and also externally by parents and communities that increase transparency of budgeting, student's assessment, and institute site performance. Student's performance dashboards can help in tracking important metrics like attendance, retention, graduation percentage.[12] Data storytelling also help to communicate insight using narrative and visualization.

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