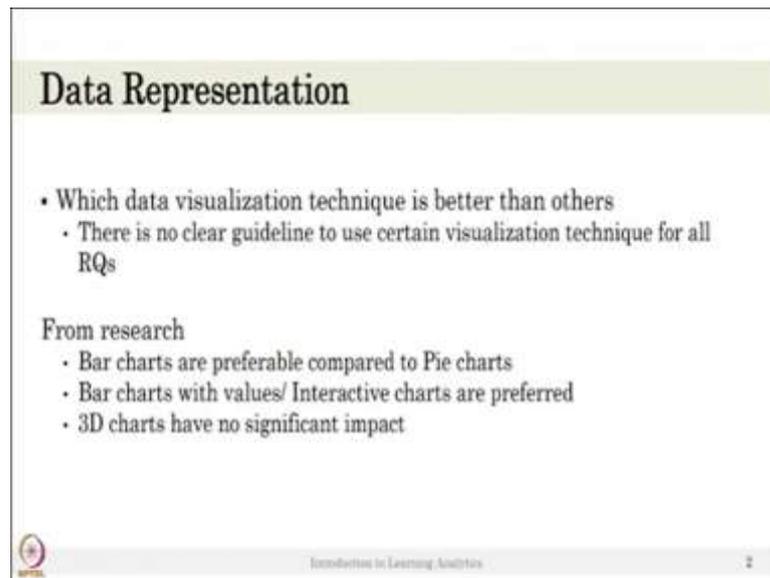


Introduction to Learning Analytics
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Lecture - 11
Data Visualization

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The slide is titled "Data Representation" and contains the following content:

- Which data visualization technique is better than others
 - There is no clear guideline to use certain visualization technique for all RQs

From research

- Bar charts are preferable compared to Pie charts
- Bar charts with values/ Interactive charts are preferred
- 3D charts have no significant impact

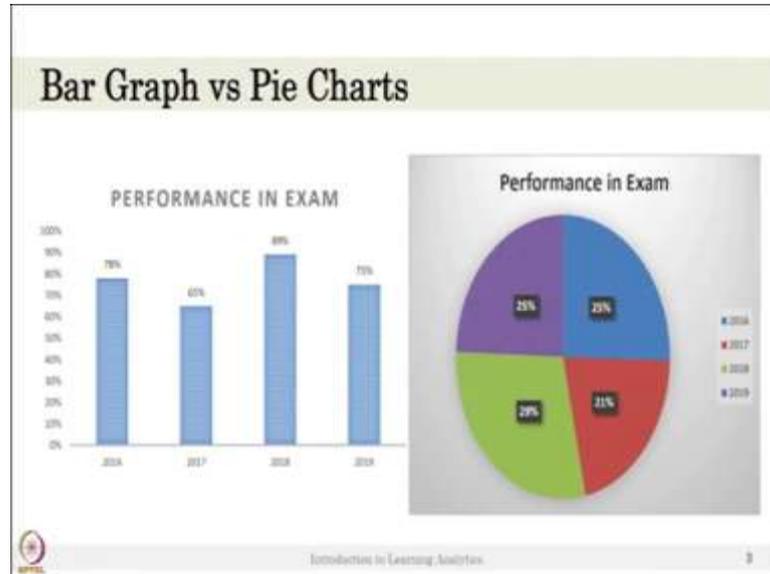
The slide also features a small logo in the bottom left corner and the text "Introduction to Learning Analytics" and the number "2" in the bottom right corner.

In this learning dialogue we will talk about Data Visualization which data visualization technique should I use for this particular RQ. In fact, there is no clear guideline to use certain visualization technique for this RQ or some other RQ, it depends on the RQ you choose and you can decide which visualization gives a more information and makes a easy appeal to the stakeholders, there is no clear guideline to do that. Above from research conducted to analyze which type of chart is better preferred by the users which chart has a less cognitive load or which chart gives more insights into the data, there are a few bullet points I reported here.

That the one is bar charts are preferable compared to pie charts. In general, but there are some places where pie charts is really useful; there are some places where bar chart is really useful. We will look at an example for that. In other places bar chart with values or interactive charts like you can over the mouse there, then you get the value is more preferred get some more insights to the users compared to the plain bar charts. And there is other research found that 3D charts have no significant impact compared to the normal

chart. So, we no need to do much of 3D things instead it has some meaning to it. The 3D charts they compared is the 3D chart in the excel sheet; it is not the latest 3D trends.

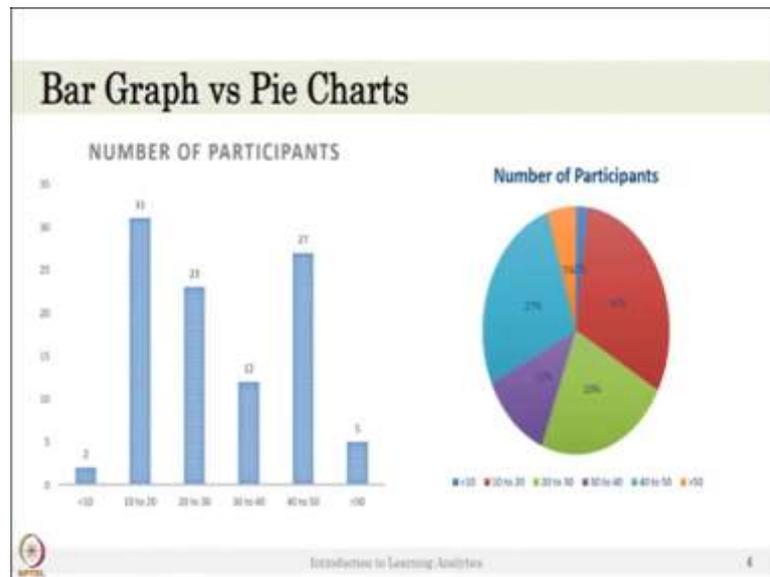
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Let us look at this data. So, this data is simply showing the pass percentage or performance in exam for last 4 years from 2016 to 2019. You see that in a bar chart it is clear that in 2016 students performs 78, in 2017 65 percentages, in 2018 it is more like 89 percentage of students passed the exam and in this year 2019 it is bit less. When you look at this data in a pie chart it looks like this, we cannot make it what is this data represents because pie chart represents the percentage of value in the whole it is not representing the values over the period of time.

So, when you represent a data over a period of time do not use pie chart, please use bar chart.

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However, when you look at this example where number of participants participated in a survey you conducted or number of participants used the app you created. So, if you look at the number of participants participated in the game or survey you conducted the age less than 10 is only 2 participants, if the age is 10 to 20 there are 31 participants and similarly for the other age group.

In this categorical variable bar chart gives a very good data also the pie chart gives the similar meaningful data. For example, you can see that the red color gives a more appeal saying that the red color is more appeared compared to the other color, which is number of participants in the age of 10 to 20 is more compared to other colors. It is a direct appeal, it looks more.

However, the bar chart gives all the data you wanted. So, you can represent in both bar chart and pie chart based on the your choice. This is the in this example I like to show that bar chart and pie chart both can be used when you use the categorical variable and it represents the number from the overall participants' value.

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Activity

Data Visualization

- What are the key benefits of data visualization for learners, teachers, and researchers?
- *Learners:* Understand their performance and impact on their actions on a specific task
- *Teachers:* Abstract view of performance and interactions in the class
- *Researchers:* Discover patterns. What happened in this course? Collect insights and communicate with others

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You have seen the data visualization right? What you think is a key benefit of data visualization for learners, teachers and researchers?

Why do you think this data visualization is important for learners and teachers and researchers? Please write down you answers, you can pause this video when you do this task after completing this task you can resume to continue. The key benefit for learners is learners have to understand the performance from the data by looking at the visualization and impact on the actions on a specific task. For example, if you want to show the learner you have done very well in last 5 questions and you are not able you are not doing good in this question; learners will feel that I am doing good, but this question might be I am having trouble. So, they know that someone is actually looking at me and asserting that I am doing good.

Or you can show a bar graph of learners performance over the period of time and learners thinks that I achieved 80 percent of the task I got to complete I have only 20 percent left. So, learner will able to perform better. So, learner will understand the current performance by looking at that visualization. Also if you give the data saying that you have spend 8 minutes on this particular task and you are able to complete this task whereas in other task you spend only two minutes reading, you are not able to do it; the learner will understand the importance of reading and spending more time on particular resources in order to complete the task.

However, this data should be shown post the learning environment post the process; not doing the process; and we do not want to intervene the learner, when they are doing the work or when they are interacting with the system. For teachers it is very important, it is like abstract view of performance and interactions in the class. The students are working on a particular learning environment, a teacher want to know how many students were able to solve the sum 1, how many students are able to solve the problem 2, how many students were able to solve the problem 3.

So, they want to get the overall abstract view. Once a student understand that problem 3 is not answered by many of the learners, then she can go and look further which learners did not able to answer then the teacher can go and talk to those students and understand what is a problem.

So, for teachers we need to provide the abstract view of the performance and interactions in the class and also a individual view; individual data of the each student so that teacher can introspect and to intervention. For researchers, data visualization is very important because it is where the researcher is trying to discover the patterns trying to understand what happened in particular learning environment, what happened in this course; is there any valuable research question can come out of this particular data.

By looking at the data patterns, looking at a data visualization, researchers can say ok, this might have a correlation, this might have a relation between these two data. So, I can start research question saying that, is there a correlation between number of faculty ratio versus performance, is there correlation between a student who takes a tuition class versus student who is not taking tuition classes. So, these kind of research questions comes from the data visualization. So, researchers collect insights and also communicate these things to the other stakeholders.