

**Introduction:**

Online classes and technology have emerged as a superhero during the lockdown days. We have all been under house arrest but are still connected with the world of education. Due to the lockdown, students have not been able to stay connected with the outer world and the lack of exposure is evident. The only reprieve for the students' mental well-being has been the transition to online classes. Teachers made sure that the learning for students was not compromised, so they took a great leap forward to find solutions and create new learning environments for their students to ensure that learning never stops. With the rapid advancements in technology and the widespread availability of internet access, online education has gained significant popularity in recent years.

**Business Problem:**

This project aims to delve deep into the various aspects of online education, examining its strengths, weaknesses, opportunities, and challenges.

**Business Requirements:**

The outcomes of this project will provide valuable insights for educational institutions, policymakers, and online learning platforms to enhance the effectiveness and accessibility of online education. This analysis of the online education system aims to contribute to the ongoing dialogue on the future of education and help shape a more inclusive, engaging, and effective learning environment in the digital age.

In [1], Yousra Banoor Rajabalee et al., coded and analyzed Student feedback for 665 students both from a quantitative and qualitative perspective. It was found that Engagement and contentment have a strong and favourable correlated relationship. Additionally, there was a marginally significant but positive association between involvement and satisfaction with their overall performances. No matter how they performed, students were usually happy with the learning design concept. However, students complained about concerns such as a lack of instructor help and group technological challenges.

In Performance measurement of e-learning using student satisfaction analysis [2] the goal of the analysis was to identify factors which influence student satisfaction and to address heterogeneous styles and needs of both groups of students, so that future pedagogical and motivational methods in teaching and learning can be appropriately selected, developed and implemented. Investigating student satisfaction with an online study method and e-learning system's quality was of special interest.

In the paper "Monitoring Trends in Student Satisfaction" [3] the results of a research that tracked every aspect of the student experience at a major metropolitan multi-campus institution from 2005 to 2011 are presented. 10,562 students from all major cohorts responded to a specifically created biannual survey that was administered repeatedly throughout the course of the time. The primary concerns the university has been tackling to improve the student experience are also covered in this document, along with trends in perceived significance and performance of various university services. The study comes to the following conclusions: (a) the time series

data offer a powerful lens into the university's strategies, initiatives, and actions that worked well and those needing additional work or adjustment; (b) it is the overall experience of the university, not just what occurs in the classroom, that shapes students' judgements.

Using student satisfaction data to evaluate a new online accelerated nursing education program [4] offers a descriptive, cross-sectional research that used student satisfaction as a quality measure to assess the efficacy of a new online accelerated programme. The research included 91 (32% of the 284) students who were enrolled or had been enrolled in a course through the online accelerated degree completion programme during the first semester of autumn 2013 and the second semester of summer 2014. Student satisfaction with the programme and related services was evaluated using the Noel-Levitz Priorities Survey for Online LearnersTM, an electronic version of the survey. The findings gave information on how satisfied the students were with the new programme structure and formed the basis of an interdepartmental programme improvement plan that intended to maintain and raise student happiness and programme quality overall.

In [5] a multivariate linear regression of all the questionnaire items was performed against an overall satisfaction item. It was discovered that five factors made a substantial contribution to a model that predicted around 70% of the reported student happiness. Student confidence in their ability to communicate and learn online, having a clear understanding of what was necessary to succeed in the unit, and how well they believed they were performing in the unit were the main factors that were found to positively influence student satisfaction with studying a wholly online unit. There are also documented other outcomes.

Data contains all the meta information regarding the columns described in the CSV files. we have provided 1 CSV files:

Online Education System Review

ONLINE EDUCATION SYSTEM REVIEW.csv

### Collect the dataset

Column Description for Online education system review:

- Gender: Gender of the student
- Home Location : Rural or Urban.
- Level of Education : UG, PG or school
- Age : age of the student
- Number of subjects :
- Device Type Used : device used to attend the online classes
- Economic status : economic status of the family
- Internet facility in your locality
- Are you involved on any sports
- Family Size
- Do elderly people monitor you ?
- Study Time(hours)

- Sleep time (hours)
- Time spent on social media(hours)
- Interested in gaming ?
- Have a separate room for studying ?
- Engaged in group studies ?
- Average marks scored before pandemic in traditional classroom
- Your interaction in online mode
- Clearing doubts with faculties online ?
- Interested in ?
- Performance in online
- Your level of satisfaction in online education

## **Connect the Data with IBM Cognos**

### **Database Connection**

Login to IBM Cognos, Launch IBM Cognos, now go to the **prepare data** section, click on upload option and upload the csv file

The screenshot shows the Power BI interface with three main sections:

- Prepare data**: Use data modules to clean and connect data from multiple resources.
- Exploration**: Quickly find unbiased answers by identifying trends in your data with data visualizations.
- Select sources**: A list of available data sources including Bookshop.xlsx, dash\_new, Education data, education\_report, exp2, and global\_fin\_index.csv.

## Select sources

The 'Select sources' dialog box displays a list of files:

- Bookshop.xlsx (4/10/2023, 12:11 AM)
- dash\_new (2/24/2023, 12:06 AM)
- Education data (6/10/2023, 1:08 AM)
- education\_report (6/10/2023, 3:09 AM)
- exp2 (2/23/2023, 11:04 PM)
- global\_fin\_index.csv

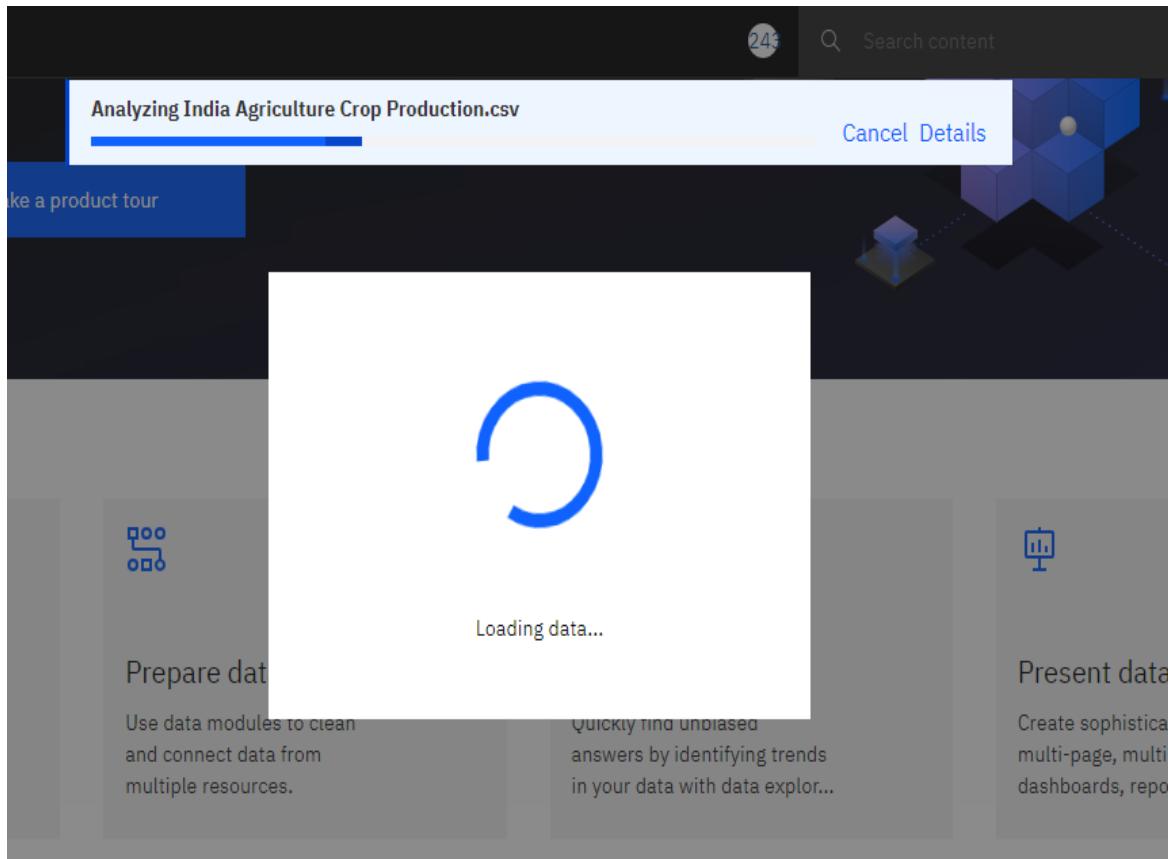
A red box highlights the upload icon (represented by a downward arrow) in the first column of the list.

← → ↑ ⌂ > This PC > Desktop >

Organize ▾ New folder

|                 | Name                              | Date modified    | Type                  | Size      |
|-----------------|-----------------------------------|------------------|-----------------------|-----------|
| Desktop         | AI-f                              | 09-12-2022 16:58 | File folder           |           |
| Downloads       | animal_dataset                    | 25-04-2023 09:51 | File folder           |           |
| Documents       | bootstrap                         | 05-06-2023 10:51 | File folder           |           |
| Pictures        | DA                                | 09-05-2023 08:46 | File folder           |           |
| Arsha           | data                              | 15-05-2023 15:21 | File folder           |           |
| Selecao         | dataset                           | 17-04-2023 15:49 | File folder           |           |
| Tableau         | Doc_files                         | 03-05-2023 11:56 | File folder           |           |
| templates       | education_tableau                 | 09-06-2023 14:16 | File folder           |           |
| OneDrive        | excel                             | 26-01-2023 09:39 | File folder           |           |
| OneDrive        | microsoft_inst                    | 27-02-2023 12:15 | File folder           |           |
| This PC         | Naive-Bayes-master                | 21-01-2023 18:00 | File folder           |           |
| 3D Objects      | new                               | 06-01-2023 17:05 | File folder           |           |
| Desktop         | office_apps                       | 28-03-2023 12:45 | File folder           |           |
| Documents       | projects                          | 25-05-2023 09:19 | File folder           |           |
| Downloads       | scrshots                          | 10-06-2023 15:44 | File folder           |           |
| Music           | Tableau                           | 10-06-2023 11:12 | File folder           |           |
| Pictures        | tableau_proj                      | 01-02-2023 19:32 | File folder           |           |
| Videos          | vit_bootstrap                     | 31-05-2023 18:24 | File folder           |           |
| Local Disk (C:) | assignment                        | 24-04-2023 18:36 | Text Document         | 1 KB      |
| New Volume (D:) | Global Superstore                 | 29-05-2023 18:31 | Microsoft Excel 97... | 17,794 KB |
|                 | India Agriculture Crop Production | 06-06-2023 14:38 | Microsoft Excel C...  | 30,266 KB |
|                 | mysql_pwd                         | 28-03-2023 10:40 | Text Document         | 1 KB      |
|                 | netflix                           | 17-03-2023 11:03 | Text Document         | 1 KB      |

The below image shows that data file is being uploaded



after the data is uploaded you will see the interface in the below image

The screenshot shows the IBM Cognos Analytics with Watson interface. At the top, there's a header bar with the title "IBM Cognos Analytics with Watson" and a sub-header "New data module". The main area has a sidebar on the left labeled "Data module" containing a search bar and a tree view of data sources. The tree view shows a folder "Navigation paths" expanded, with "India Agri...uction.csv" selected. Other items in the tree include "Row Id", "State", "District", "Crop", "Year", "Season", "Area", "Area Units", "Production", and "Production Units". To the right of the sidebar, there's a "Grid" tab selected, showing a preview icon with a checkmark and the text "Preview data". Below the preview icon, it says "To preview data, select a table, a column in a table, or a folder that contains columns." On the far right, there's an "Activate Windows" message with a link to "Go to Settings to activate Windows".

## Data Preparation

Data preparation is the process of preparing raw data so that it is suitable for further processing and analysis.

### Prepare the Data for Visualization

Preparing the data for visualization involves cleaning the data to remove irrelevant or missing data, transforming the data into a format that can be easily visualized, exploring the data to identify patterns and trends, filtering the data to focus on specific subsets of data, preparing the data for visualization software, and ensuring the data is accurate and complete. This process helps to make the data easily understandable and ready for creating visualizations to gain insights into the performance and efficiency.

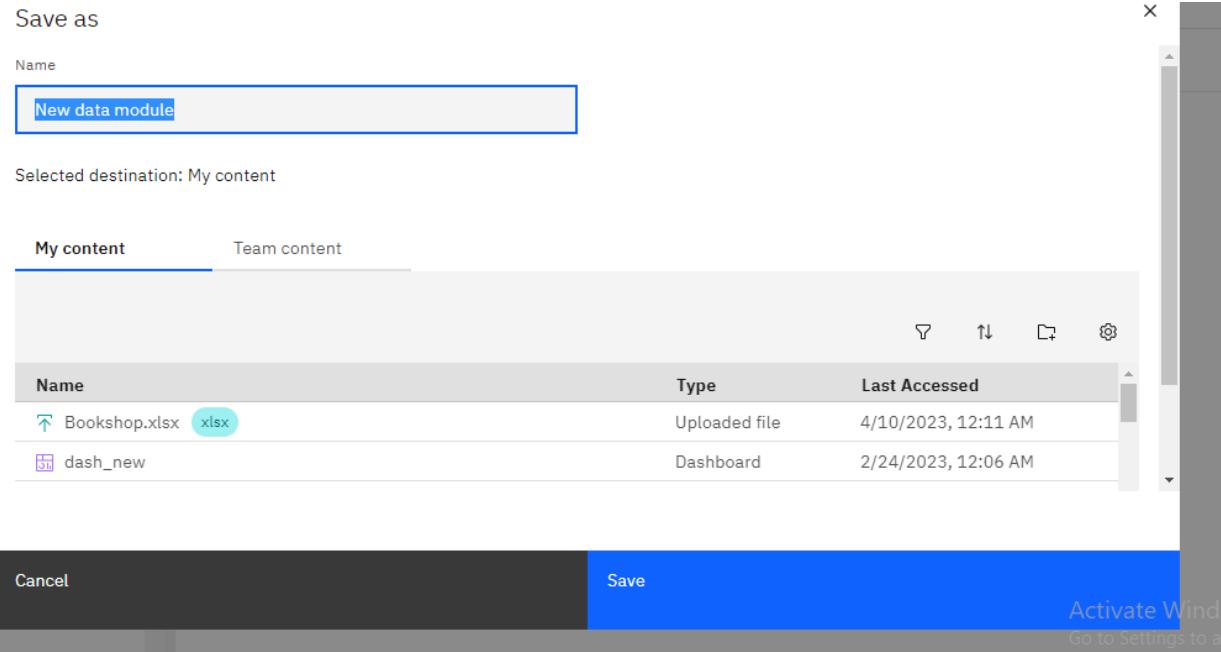
Data preprocessing can be performed in many ways using many different steps depending on your data here, we are going to do some part of data preparation on our data.

Once you upload the data into the data module, you will encounter the interface shown in the below image

The screenshot shows the IBM Cognos Analytics with Watson interface. The top navigation bar includes the product name, a dropdown for the project ('online\_education'), a search bar, and user account information. Below the header is a toolbar with various icons. The main area is titled 'Data module' and contains a search bar and a tree view of data assets. A specific asset, 'ONLINE E...VIEW.csv', is selected and expanded, showing its columns: Row Id, Gender, Home Location, Level of Education, Age(Years), Number o...ubjects, Device ty... classes, Economic status, Family size, Internet f... locality, and Are you i...y sports?. To the right of the tree view is a circular icon with a grid and a checkmark, labeled 'Preview data'. Below it is a note: 'To preview data, select a table, a column in a table, or a folder that contains columns.' At the bottom right, there is a message: 'Activate Windows' and 'Go to Settings to activate Windows.'

Remember to save this data in ‘My content’ section

This screenshot is identical to the one above, showing the IBM Cognos Analytics with Watson interface. However, the 'Save' button in the toolbar has been highlighted with a red box. The rest of the interface, including the Data module view, preview data section, and system status indicators, remains the same.



To preview the data , double click on any of the data fields

IBM Cognos Analytics with Watson

Education data

24

Search content

Properties

Data module

Grid Relationships Custom tables

Search

Education data

- Navigation paths
- ONLINE E...VIEW.csv
- # Row Id
- abc Gender
- abc Home Location
- abc Level of Education**
- Age(Years)
- Number o...ubjects
- abc Device ty... classes
- abc Economic status
- Family size
- Internet f... locality
- abc Are you i... v sports?

| Row Id | Gender | Home Location | Level of Education | Age(Years)                          | Number of Subjects |
|--------|--------|---------------|--------------------|-------------------------------------|--------------------|
| 1      | Male   | Urban         | Under Graduate     | 18                                  | 11                 |
| 2      | Male   | Urban         | Under Graduate     | 19                                  | 7                  |
| 3      | Male   | Rural         | Under Graduate     | 18                                  | 5                  |
| 4      | Male   | Urban         | Under Graduate     | 18                                  | 5                  |
| 5      | Male   | Rural         | Under Graduate     | 18                                  | 5                  |
| 6      | Male   | Urban         | Under Graduate     | 18                                  | 5                  |
| 7      | Male   | Urban         | Under Graduate     | 19                                  | 5                  |
| 8      | Male   | Urban         | Under Graduate     | 17                                  | 4                  |
| 9      | Female | Urban         | Under Graduate     | 19                                  | 5                  |
| 10     | Female | Rural         | Under Graduate     | 20                                  | 9                  |
|        | Female | Urban         | Under Graduate     | 20                                  | 9                  |
|        |        |               |                    | Activate Windows                    | 9                  |
|        |        |               |                    | Go to Settings to activate Windows. |                    |
|        |        |               |                    | 10                                  | A                  |

If you want to rename any field, click on the ‘three dots’ at the right side of the field

IBM Cognos Analytics with Watson

Data module

Search

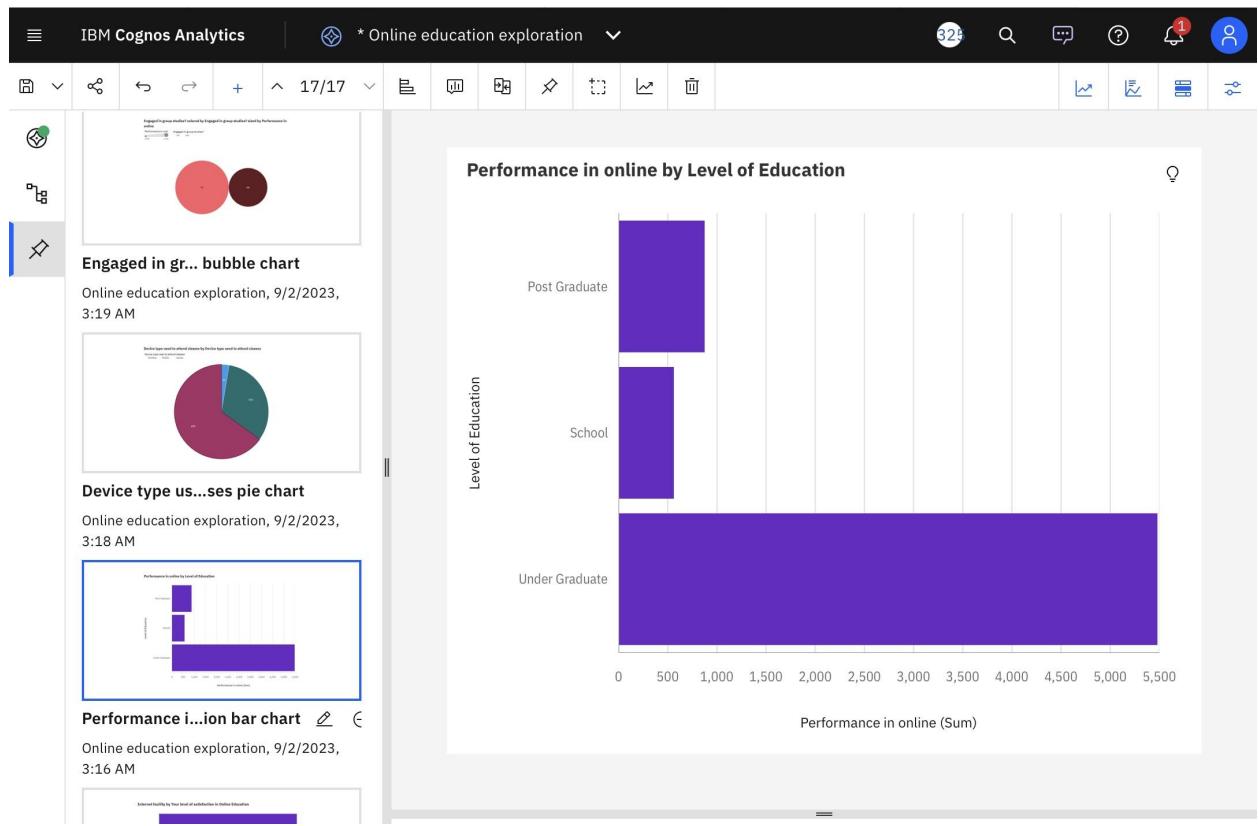
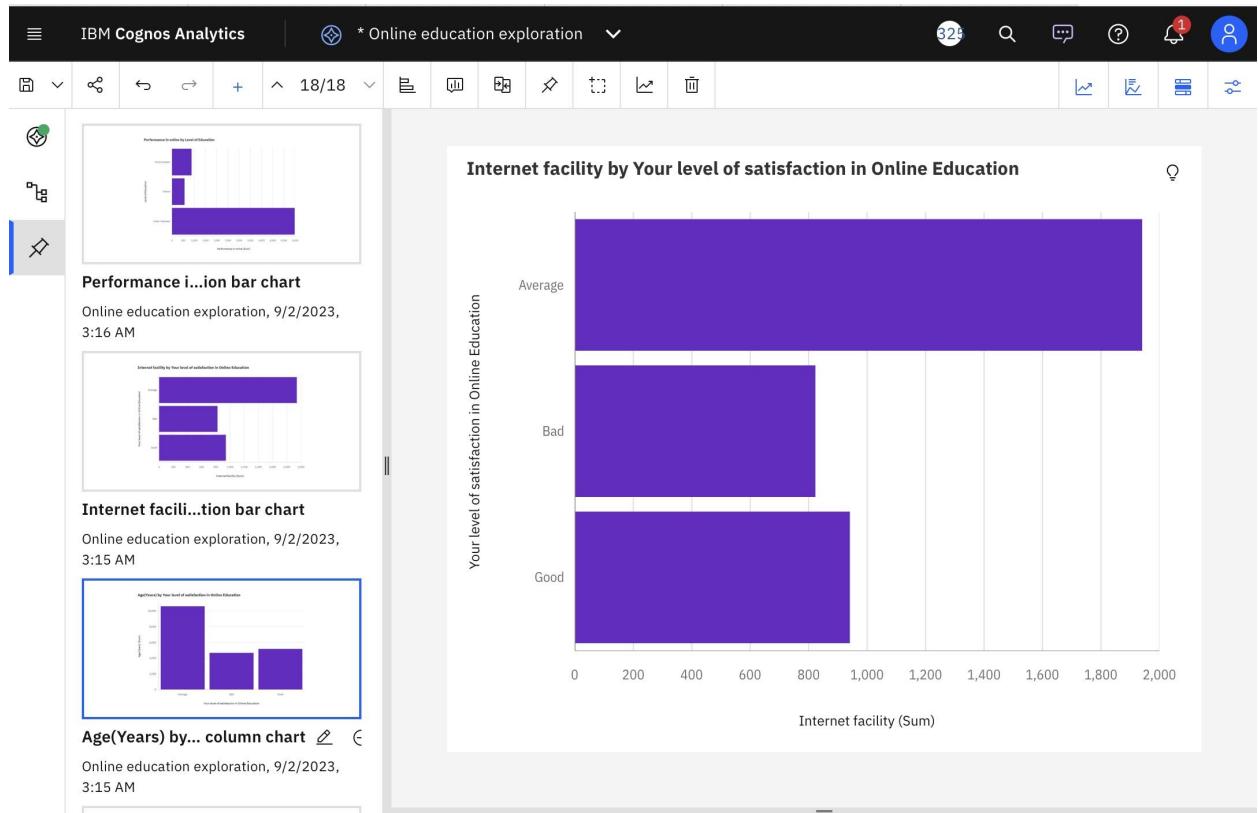
- Education data
  - Navigation paths
  - ONLINE E...VIEW.csv
    - # Row Id
    - abc Gender
    - abc Home Location
    - abc Level of Education
    - L Age(Years)
    - L Number o...bjects
    - abc Device ty... classes :
    - abc Economic status
    - L Family size
    - L Internet f... locality
    - abc Are you i... sports?

The screenshot shows the IBM Cognos Analytics with Watson interface. At the top, there's a navigation bar with icons for file, search, and navigation, followed by the title "IBM Cognos Analytics with Watson" and a dropdown menu "Education data". Below the title is a toolbar with icons for refresh, search, and other functions. The main area is a "Data module" view. On the left, there's a tree view of data objects under "Education data", including "Navigation paths", "ONLINE E...VIEW.csv", and several columns like "# Row Id", "Gender", "Home Location", etc. A context menu is open over one of the columns in the tree. The menu items are: Filter..., Create data group..., Create navigation path..., Search for members..., Refresh members, Split..., Hide from users, Remove, Refresh properties..., Format data..., Clean..., Rename (which is highlighted with a red box), Cut, Copy, and Properties. The "Rename" option is the last item in the list.

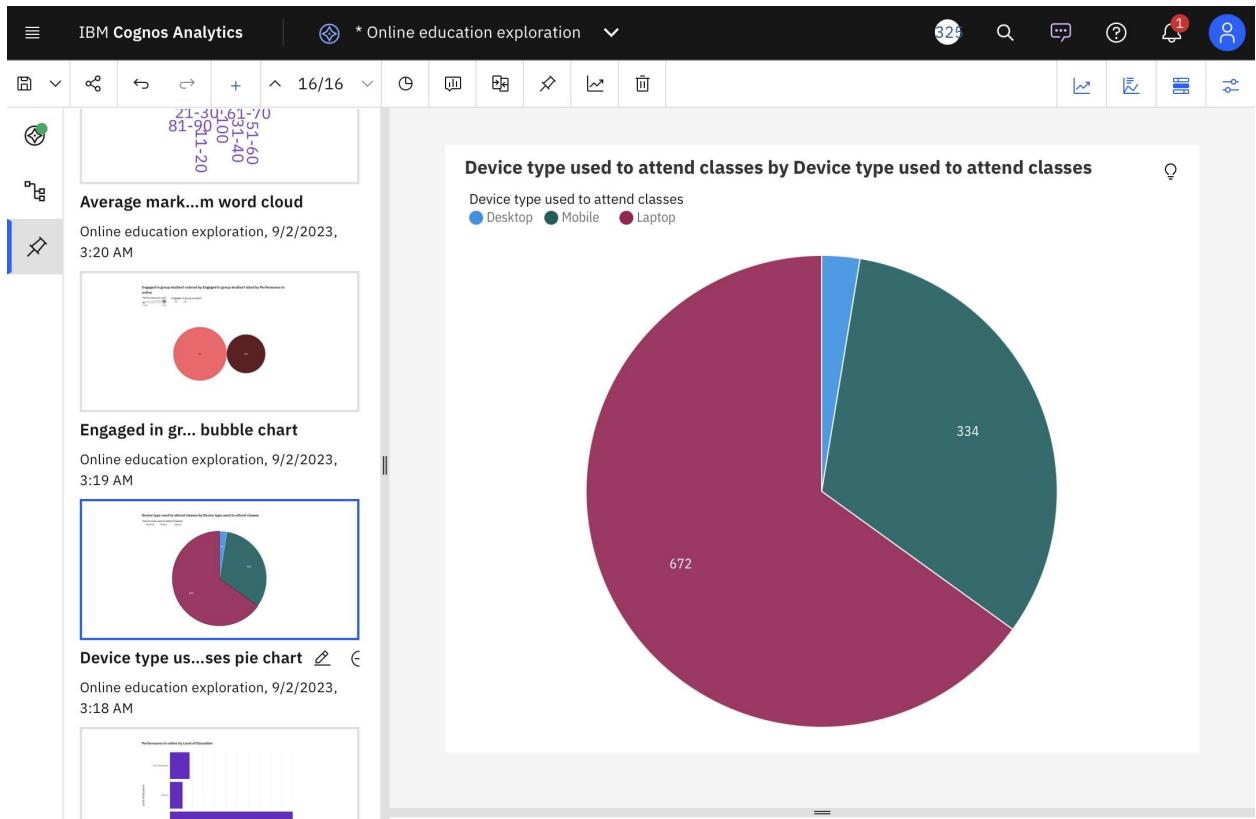
## Data Visualization

Data visualization is the process of creating graphical representations of data in order to help people understand and explore the information. The goal of data visualization is to make complex data sets more accessible, intuitive, and easier to interpret. By using visual elements such as charts, graphs, and maps, data visualizations can help people quickly identify patterns, trends, and outliers in the data.

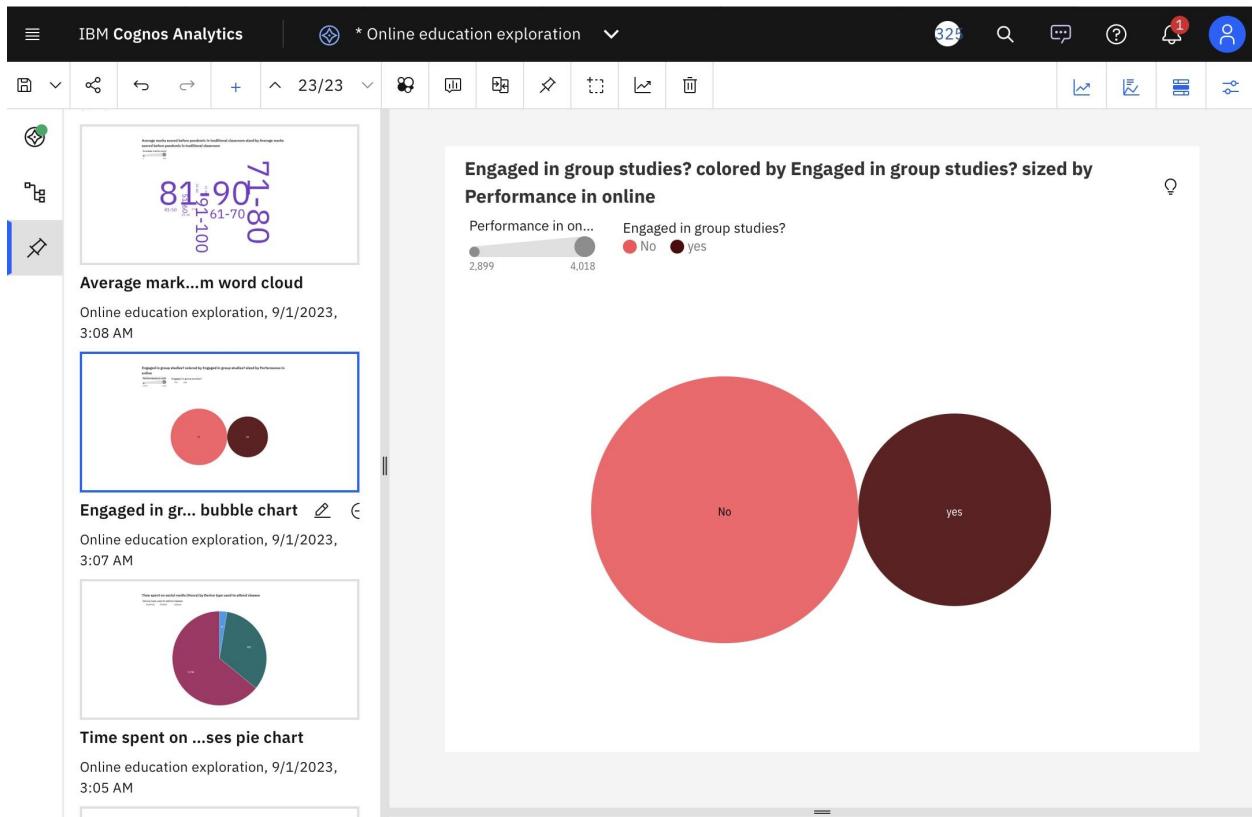
### Column Chart



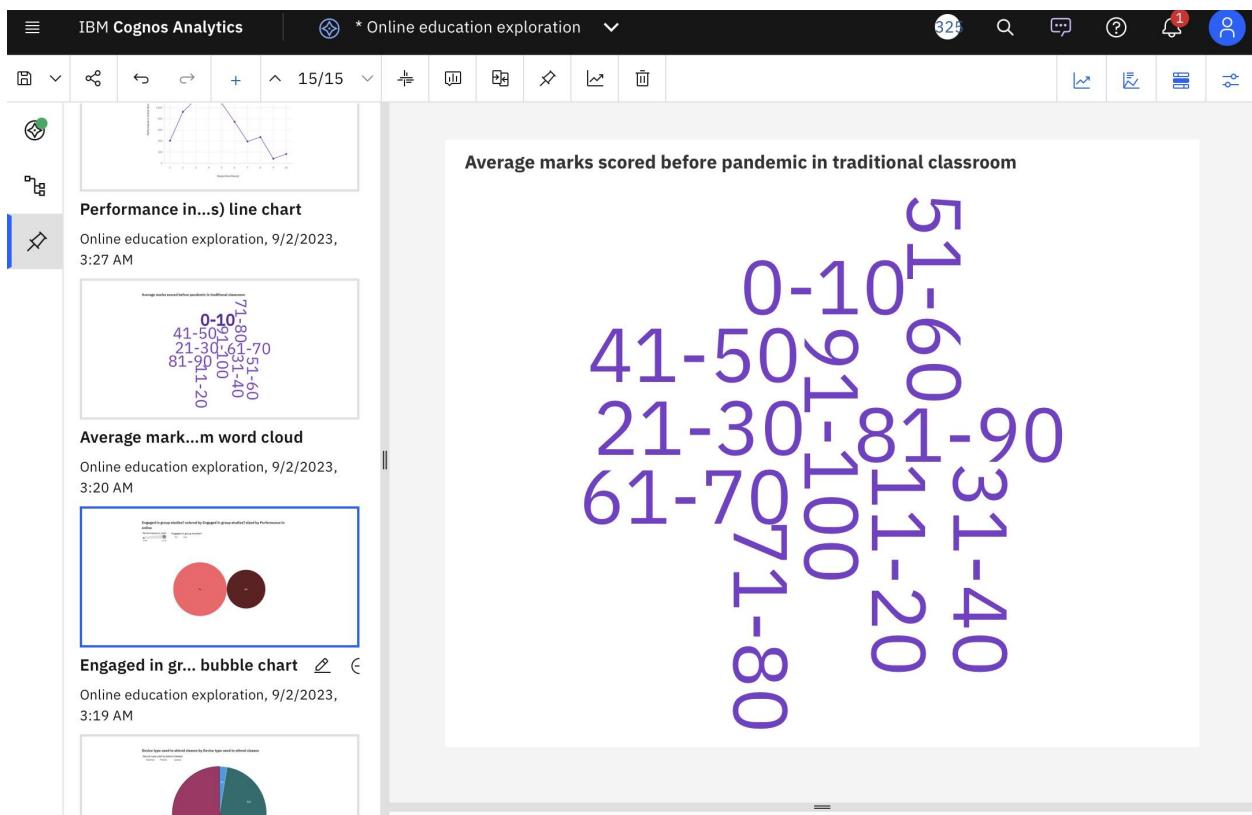
## Pie Chart



## Packed Bubbles



## Word Cloud



## Summary

IBM Cognos Analytics \* Online education exploration

Economic stat...ocation table

Online education exploration, 9/1/2023, 3:10 AM

Average mark...m word cloud

Online education exploration, 9/1/2023, 3:08 AM

Engaged in gr... bubble chart

Online education exploration, 9/1/2023, 3:07 AM

**Economic status, Performance in online and Home Location**

| Economic status | Home Location | Performance in online |
|-----------------|---------------|-----------------------|
| Middle Class    | Rural         | 6.72                  |
|                 | Urban         | 6.68                  |
| <b>Summary</b>  |               | Processing...         |
| Poor            | Rural         | 6.49                  |
|                 | Urban         | 6.07                  |
| <b>Summary</b>  |               | Processing...         |
| Rich            | Rural         | 9                     |
|                 | Urban         | 7.11                  |
| <b>Summary</b>  |               | Processing...         |
| <b>Summary</b>  |               | Processing...         |

## Line Chart

IBM Cognos Analytics \* Online education exploration

Internet facili...ation bar chart

Online education exploration, 9/2/2023, 3:15 AM

Age(Years) by... column chart

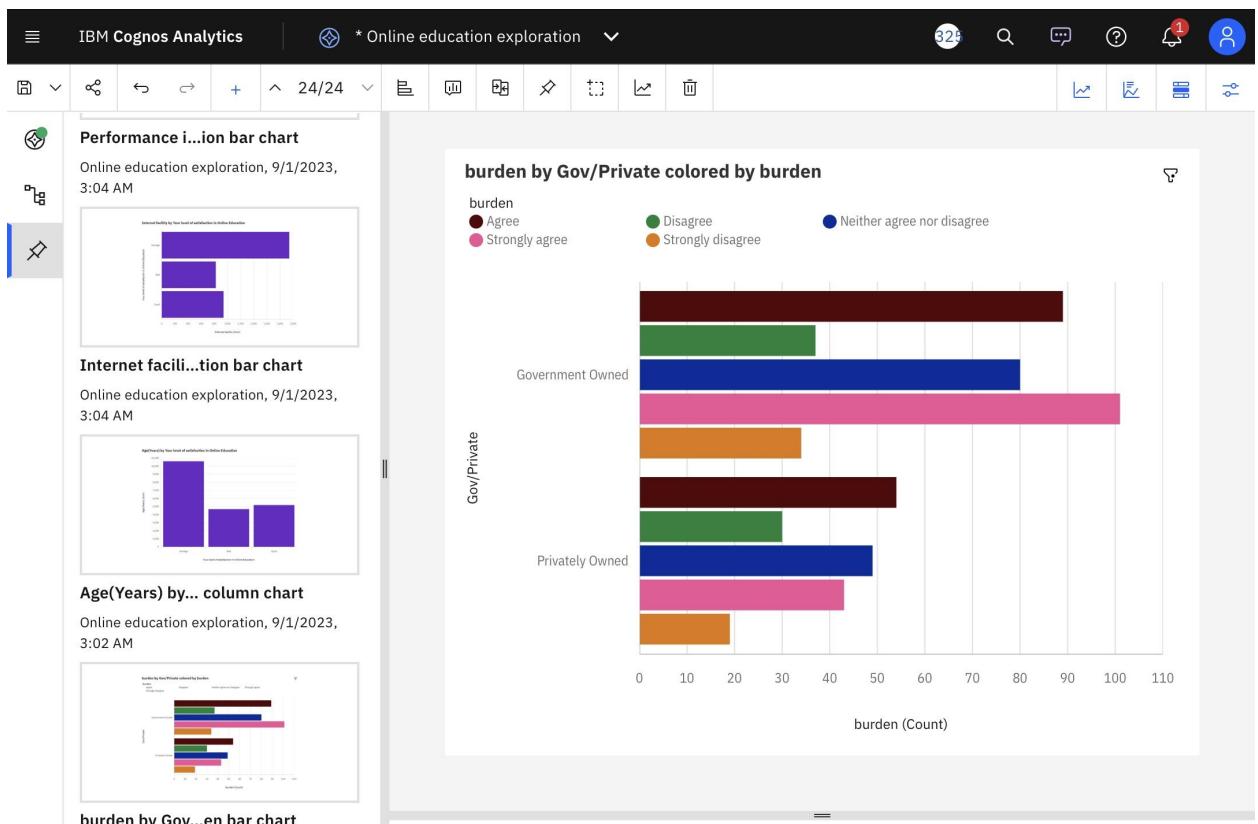
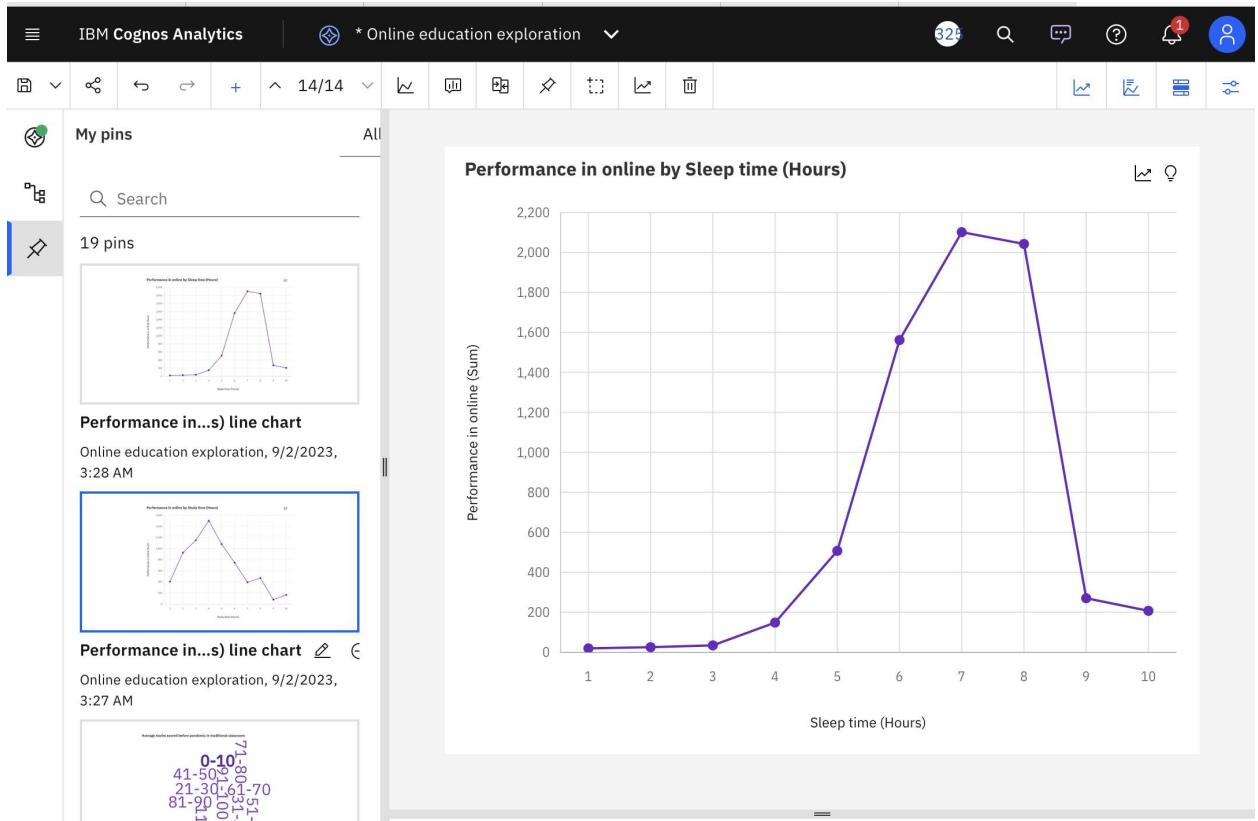
Online education exploration, 9/2/2023, 3:15 AM

Performance i...on line chart

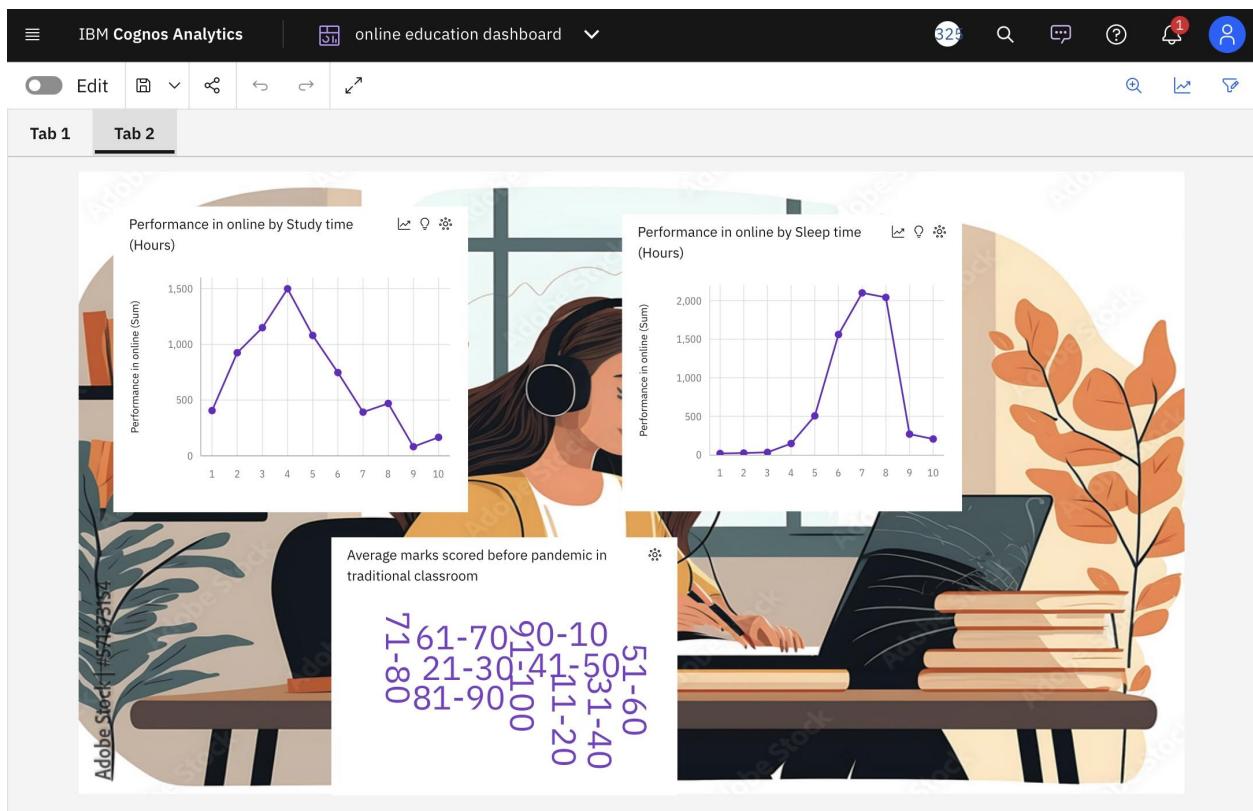
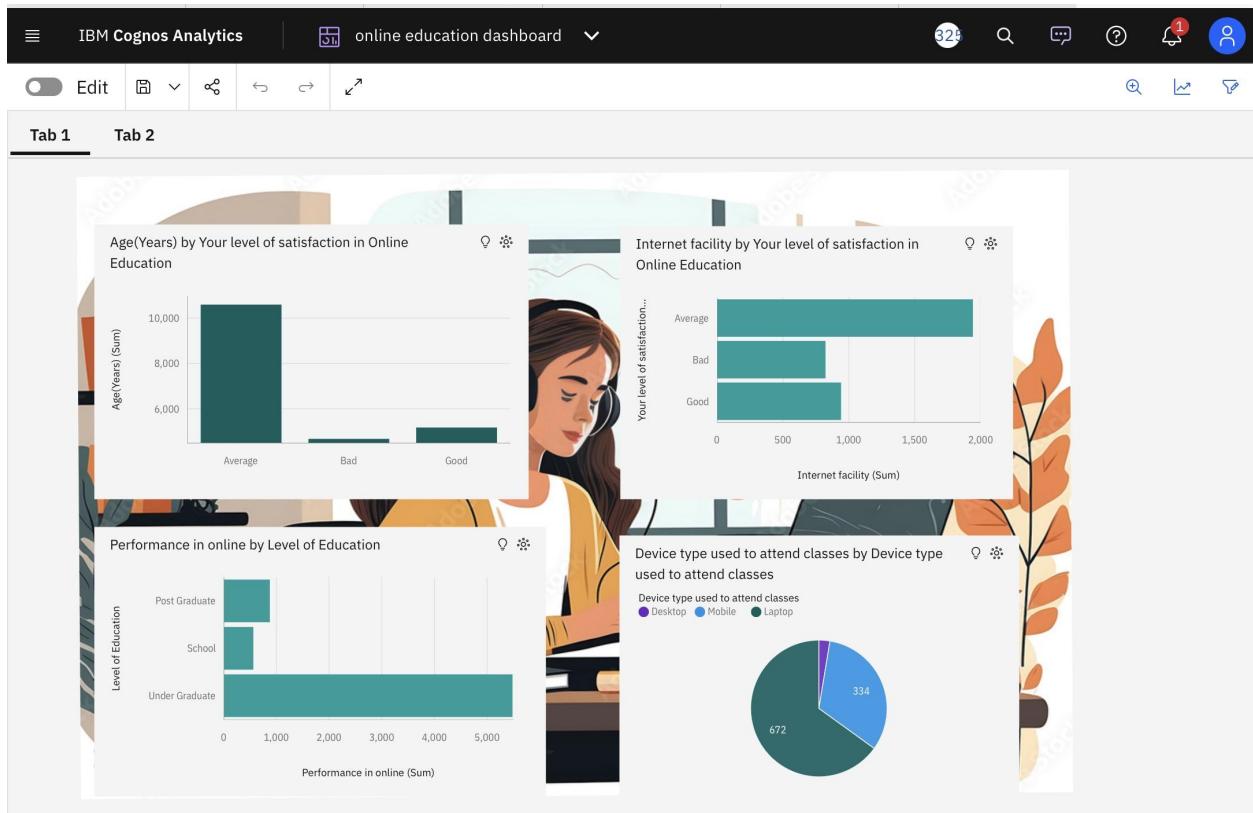
Online education exploration, 9/1/2023, 3:35 AM

**Performance in online by Time spent on social media (Hours) colored by Level of Education**

| Time spent on social media (Hours) | Post Graduate | School | Under Graduate |
|------------------------------------|---------------|--------|----------------|
| 1                                  | ~300          | ~150   | ~1550          |
| 2                                  | ~250          | ~180   | ~1900          |
| 3                                  | ~200          | ~100   | ~1000          |
| 4                                  | ~100          | ~50    | ~500           |
| 5                                  | ~50           | ~20    | ~300           |
| 6                                  | ~20           | ~10    | ~100           |
| 7                                  | ~10           | ~5     | ~50            |
| 8                                  | ~5            | ~5     | ~50            |
| 9                                  | ~5            | ~5     | ~20            |
| 10                                 | ~10           | ~5     | ~50            |



Dashboard



Story

A screenshot of the IBM Cognos Analytics interface, specifically the VC Story feature. The main content area displays a presentation slide with a blue background. The title of the slide is "Unveiling Virtual Classroom Analysis of Online Education System". The slide features a central image of an open laptop displaying a document, surrounded by various educational icons like a stethoscope, a lightbulb, and a test tube. The bottom of the slide has a decorative pattern of clouds and a world map. At the bottom of the screen, there is a navigation bar with buttons for "Prev scene", "Next scene", and "Scene 1 of 10", along with a progress bar showing "0:00.0" and "0:05.0".

According to this rich rural students perform relatively better compared to other students

| Economic status | Home Location | Performance in online |
|-----------------|---------------|-----------------------|
| Middle Class    | Rural         | 6.72                  |
|                 | Urban         | 6.68                  |
| <b>Summary</b>  |               | 6.69                  |
| Poor            | Rural         | 6.49                  |
|                 | Urban         | 6.07                  |
| <b>Summary</b>  |               | 6.37                  |
| Rich            | Rural         | 9                     |
|                 | Urban         | 7.11                  |
| <b>Summary</b>  |               | 7.3                   |
| <b>Summary</b>  |               | 6.7                   |

IBM Cognos Analytics | VC Story ▾

325 Q ⚡ ⓘ 1 🔔

Edit 📄 ⌂ ⌂ ⌂ ⌂ ⌂

# Performance and Social Media

Performance in online by Time spent on social media (Hours) colored by Level of Education ♀ ☺

Level of Education

- Post Graduate
- School
- Under Graduate

| Time spent on social media (Hours) | Post Graduate | School | Under Graduate |
|------------------------------------|---------------|--------|----------------|
| 1                                  | ~300          | ~100   | ~1550          |
| 2                                  | ~250          | ~150   | ~1900          |
| 3                                  | ~150          | ~50    | ~1000          |
| 4                                  | ~50           | ~20    | ~500           |
| 5                                  | ~20           | ~10    | ~300           |
| 6                                  | ~10           | ~5     | ~50            |
| 7                                  | ~5            | ~5     | ~20            |
| 8                                  | ~5            | ~5     | ~20            |
| 9                                  | ~5            | ~5     | ~10            |
| 10                                 | ~10           | ~5     | ~50            |

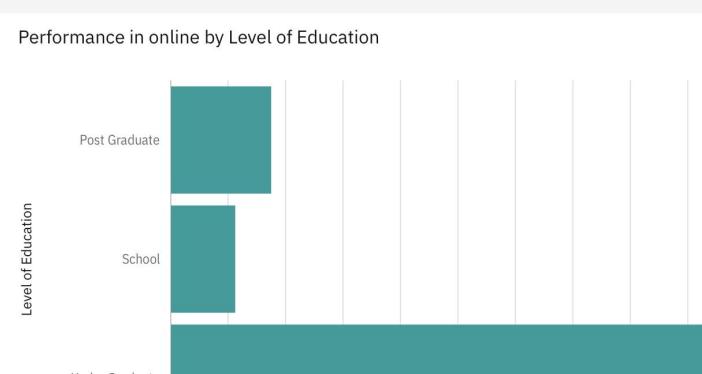
Performance in online (Sum)

Time spent on social media (Hours)

Prev scene ⌂ ⌂ ⌂ ⌂ ⌂ Next scene Scene 9 of 10 0:01.6 0:10.0

# Level of Education and Performance

Performance in online by Level of Education



| Level of Education | Performance in online (Sum) |
|--------------------|-----------------------------|
| Post Graduate      | ~800                        |
| School             | ~500                        |
| Under Graduate     | ~5,300                      |

Performance in online is unusually high when the combination of Level of Education and Gender is Under Graduate and Male.

Performance in online by Level of Education colored by Gender

Gender

- Female
- Male

| Level of Education | Female (Performance in online Sum) | Male (Performance in online Sum) |
|--------------------|------------------------------------|----------------------------------|
| Post Graduate      | ~400                               | ~500                             |
| School             | ~200                               | ~350                             |
| Under Graduate     | ~2350                              | ~3200                            |

IBM Cognos Analytics | VC Story

### Time spent on social Media

Time spent on social media (Hours) is unusually high when Level of Education is Under Graduate.

Time spent on social media (Hours) by Level of Education

Level of Education

- School
- Post Graduate
- Under Graduate

| Level of Education | Time spent (Hours) |
|--------------------|--------------------|
| School             | 247                |
| Post Graduate      | 351                |
| Under Graduate     | 2,126              |

Prev scene | Next scene | Scene 6 of 10 | 0:01.5 | 0:10.0 |

IBM Cognos Analytics | VC Story

### Study Time vs Performance

Performance in online is unusually high when Study time (Hours) is 4.

Performance in online by Study time (Hours)

.... Forecast

| Study time (Hours) | Performance in online (Sum) |
|--------------------|-----------------------------|
| 1                  | 400                         |
| 2                  | 900                         |
| 3                  | 1150                        |
| 4                  | 1500                        |
| 5                  | 1100                        |
| 6                  | 750                         |
| 7                  | 400                         |
| 8                  | 500                         |
| 9                  | 100                         |
| 10                 | 200                         |
| 11                 | -100                        |
| 12                 | -100                        |

Prev scene | Next scene | Scene 5 of 10 | 0:05.0 | 0:05.0 |

IBM Cognos Analytics | VC Story

325 | Search | Refresh | Help | Logout

Edit | View | Insert | Undo | Redo | Save

## How sleep affects Performance online

Performance in online is unusually high when Sleep time (Hours) is 7 and 8.

Performance in online by Sleep time (Hours)

The chart displays a single data series showing the relationship between sleep time and online performance. The x-axis represents 'Sleep time (Hours)' from 1 to 10, and the y-axis represents 'Performance in online (Sum)' from 0 to 2,000. The data points show a sharp increase starting around 4 hours of sleep, peaking at approximately 2,050 for 7 and 8 hours of sleep, before declining sharply towards 9 and 10 hours.

| Sleep time (Hours) | Performance in online (Sum) |
|--------------------|-----------------------------|
| 1                  | ~50                         |
| 2                  | ~50                         |
| 3                  | ~50                         |
| 4                  | ~150                        |
| 5                  | ~500                        |
| 6                  | ~1600                       |
| 7                  | ~2100                       |
| 8                  | ~2050                       |
| 9                  | ~250                        |
| 10                 | ~180                        |

Prev scene | Next scene | Scene 4 of 10 | 0:03.1 ————— 0:05.0 | Settings

According to this majority of students use laptop for social media

# Which device is used most to spend time online

Time spent on social media (Hours) by Device type used to attend classes

Device type used to attend classes

- Desktop
- Mobile
- Laptop

A pie chart titled "Time spent on social media (Hours) by Device type used to attend classes". The chart shows three categories: Laptop (dark teal), Mobile (light blue), and Desktop (purple). The Laptop category is the largest, followed by Mobile, and then Desktop. The values are labeled inside the slices: 1,746 for Laptop, 907 for Mobile, and a small value for Desktop.

| Device Type | Time Spent (Hours)                   |
|-------------|--------------------------------------|
| Laptop      | 1,746                                |
| Mobile      | 907                                  |
| Desktop     | Small value (not explicitly labeled) |

Prev scene Next scene Scene 3 of 10 0:06.6 — 0:10.0

The column chart demonstrates level of satisfaction regarding online by students of different ages

# Level of Satisfaction by Age

Your level of satisfaction in Online Education by Age(Years) (Group)

| Age Group    | Satisfaction Level (Count distinct) |
|--------------|-------------------------------------|
| less than 1  | 2                                   |
| 16 to < 22   | 3                                   |
| 22 to < 28   | 3                                   |
| 28 to < 34   | 1                                   |
| 34 and above | 3                                   |

Prev scene Next scene Scene 2 of 10 0:04.8 - 0:10.0

# Report

