UNVEILING THE VIRTUAL CLASSROOM: AN IN-DEPTH ANALYSIS OF THE ONLINE EDUCATION SYSTEM

Ms. M. Sathya Thendral

Assistant Professor

PSNA College of Engineering and Technology

1. INTRODUCTION

1.1. Overview

The COVID-19 pandemic has accelerated the emergence of online education and virtual classrooms, acting as a crucial lifeline for students seeking to continue learning during trying circumstances. The transition to online classes has unveiled both possibilities and obstacles, leaving a significant imprint on the education system. The central objective of this project is to cultivate a more comprehensive, engaging, and efficient learning environment in the digital era, adding to the ongoing discourse about the future of education. The project proposal delineates an extensive examination of online education and its consequences on students, educators, and the broader education system. The sudden shift to virtual classrooms has presented both prospects and challenges for educational institutions, policymakers, and online learning platforms. A thorough comprehension of the strengths, limitations, opportunities, and challenges linked to online education is indispensable for informed decision-making aimed at refining its effectiveness and accessibility.

1.2. Purpose

The primary goal of this project is to offer valuable insights into the strengths, weaknesses, opportunities, and challenges of online education. The ultimate objective is to enhance online education methods and platforms, ensuring their effectiveness, accessibility, and engagement for learners in the digital era. The business aims to optimize online education to ensure students attain their learning goals and maintain knowledge at par with traditional classrooms. Equipping educators with essential skills and training to effectively conduct online classes, employ digital tools, and engage students in virtual settings is imperative. The business necessitates a robust technological infrastructure that includes dependable internet connectivity, digital device access, and secure virtual classroom platforms.

2. LITERATURE SURVEY

2.1. Existing Problem

S.No	Name of the Paper	Description
1.	Walker, S.M., 2023. Can the Use of Instructor Self-Disclosure Influence Collective Resilience in the Virtual Classroom During the COVID-19 Pandemic?. In *Female Academics' Resilience during the COVID-19 Pandemic: Intercultural Perspectives* (pp. 273-293). Cham: Springer International Publishing.	This study investigated how instructor self-disclosure influences collective resilience in virtual classrooms during the COVID-19 pandemic. While no direct link was found, participant narratives indicated that instructor interactions played a role. Thematic analysis revealed themes like teaching evaluation, collective resilience, instructor values, self-disclosure, and instructor responsiveness.

2.	Khanal, J., 2023. Shifting identities: an examination of student perceptions and experiences in face-to-face and online learning in Nepal. *Education and Information Technologies*, pp.1-29.	This study addresses the challenges of transitioning to online learning in low-income countries like Nepal. It investigates how students adapt to this change, revealing that their identities undergo instability due to tensions between their self-perception in traditional classrooms and online learning environments.
3.	AlQaheri, H. and Panda, M., 2022. An education process mining framework: Unveiling meaningful information for understanding students' learning behavior and improving teaching quality. *Information*, *13*(1), p.29.	This study focuses on using automated process discovery algorithms (IvM and DFvM) to create valid process models for educational process mining. The models were evaluated on the xAPI dataset, showcasing their effectiveness in understanding and predicting student learning behaviors.
4.	Cui, Y., Ma, Z., Wang, L., Yang, A., Liu, Q., Kong, S. and Wang, H., 2023. A survey on big data-enabled innovative online education systems during the COVID-19 pandemic. *Journal of Innovation & Knowledge*, *8*(1), p.100295.	Amid the COVID-19 pandemic, the education sector has embraced online teaching and health monitoring. This paper examines the fusion of big data with online education, highlighting innovative methods like MOOC and virtual classrooms. It analyzes their impact, envisions future prospects, and explores the symbiotic relationship between big data and online education, shedding light on challenges and future possibilities.
5.	Montes-Iturrizaga, I., Zambrano Aranda, G.M., Pamplona-Ciro, Y.L. and Villalba-Condori, K.O., 2023. Perceptions about the Assessment in Emergency Virtual Education Due to COVID-19: A Study with University Students from Lima. *Education Sciences*, *13*(4), p.378.	The COVID-19 pandemic prompted Peruvian universities to swiftly transition to virtual education, posing challenges in formative assessment due to professors' limited preparation. A survey of 240 students from a private university in Lima highlighted a reliance on multiple choice tests, despite recognizing the value of essay tests. Discipline-specific differences emerged, with law students assessed through essays and psychology students through oral tests.

2.2. Proposed Solution

The analysis has a broad social impact. Improving accessibility in online education can bridge educational gaps and offer equal opportunities to students from diverse backgrounds. From a business perspective, understanding challenges faced by students and educators can inspire innovative solutions and services. Online learning platforms and educational technology providers can tailor offerings to meet specific needs, boosting market competitiveness.

The proposed system aims to utilize IBM Cognos Analytics' robust capabilities to revolutionize education through comprehensive data analysis and visualization tools. Integration of this platform enables institutions to gain insights into student performance, course efficacy, and learning outcomes. Interactive dashboards, predictive analytics, and adaptive learning features empower educators and administrators to make informed decisions, optimize resource allocation, and personalize learning. This data-driven approach enhances education quality and encourages continuous improvement, fostering an effective and engaging learning environment.

3. THEORETICAL ANALYSIS

3.1. Block Diagram

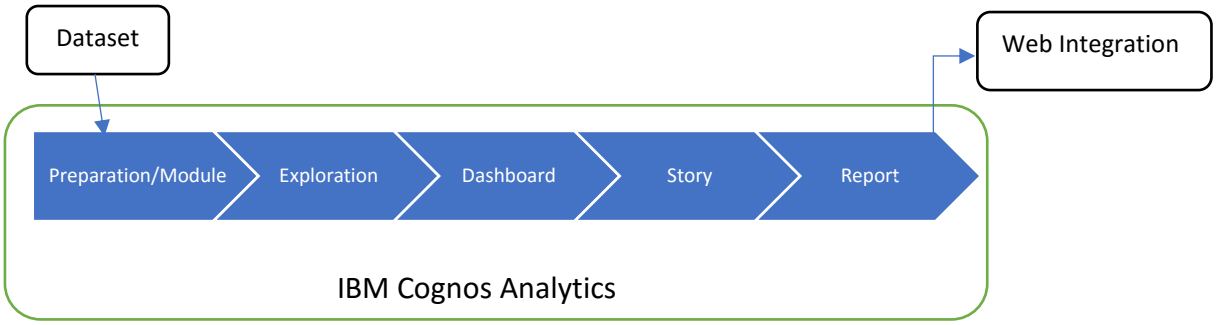

Figure 1. Block Diagram

Figure 1 illustrates the proposed system's block diagram. The input dataset is collected and then fed into the IBM Cognos Analytics tool.

3.2. Hardware/Software Designing

3.2.1. Dataset

The initial step entails gathering pertinent information from various sources, including student records, attendance records, exam results, and course materials. There may be many different formats for this data, such as databases and spreadsheets. The dataset is stored as csv files.

3.2.2. Data Preparation

IBM Cognos Analytics then enters into the scene. It makes it possible to connect these data sources. Through this procedure, IBM Cognos offers connectors that simplify the import and central management of data. Once connected to IBM Cognos, the data might need to be cleaned and transformed for consistency and correctness. Data cleansing, filtering, and manipulation tools

are provided by IBM Cognos. These tools make it easier to perform tasks like eliminating duplicates, fixing errors, and formatting data as necessary.

3.2.3. Data Exploration

A wide variety of tools are available through IBM Cognos Analytics to produce various types of data visualizations. These include pie charts, bar charts, line graphs, and more. The exact findings to be communicated will determine which visuals are used. Using Cognos, We can easily choose data, select chart kinds, and alter the colors and labels to create comprehensible and interesting representations

3.2.4. Dashboard

Cognos enables the creation of dynamic and interactive dashboards. Visualizations, charts, and tables are logically placed within these dashboards. The built-in responsive design makes sure that all platforms, including PCs, tablets, and smartphones, perform and look their best.

3.2.5. Story

The development of dynamic data narratives is made possible by IBM Cognos Analytics through a series of scenes. Each scene is a concise representation of a different aspect of the analysis or data story. User-friendly drag-and-drop capabilities are provided by IBM Cognos Analytics' user-friendly interface. The platform helps the conversion of data into useful knowledge by collecting, organizing, visualizing, creating dashboards, and conveying stories.

3.2.6. Report

A report is a document that presents information in a specific format and layout, usually based on data from a database or other data source. A report in IBM Cognos can contain various elements, such as tables, charts, graphs, and images, as well as text and data elements, and it is designed to be used by business users to help them better understand their data and make informed decisions. There are several different types of reports available in IBM Cognos, including list reports, crosstab reports, chart reports, and report studio reports, among others.

3.2.7. Web Integration

Publishing helps us to track and monitor key performance metrics, to communicate results and progress. help a publisher stay informed, make better decisions, and communicate their performance to others.

4. EXPERIMENTAL INVESTIGATION

The experimental investigations yield actionable insights into the potential impact of IBM Cognos Analytics on online education. By analyzing student performance, predicting areas of concern, and tailoring learning experiences, the project aims to enhance the overall quality of online education. The use of interactive dashboards and storytelling techniques ensures that the findings are effectively communicated to educators, administrators, and policymakers, facilitating evidence-based decision making. By harnessing the capabilities of IBM Cognos Analytics, this project aims to contribute to the ongoing dialogue on educational innovation and cultivate a more dynamic and effective learning environment in the digital age.

5. FLOWCHART

Figure 2 shows the flowchart of enhancing online education using IBM Cognos Analytics Tool.

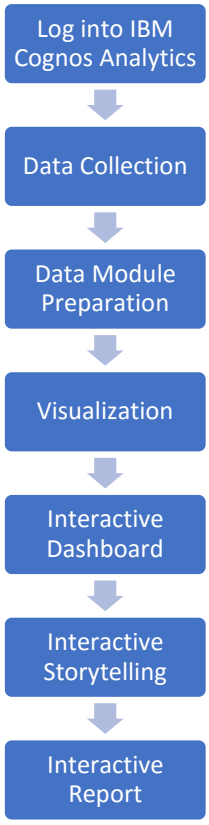

Figure 2. Flowchart of enhancing online education

6. RESULT

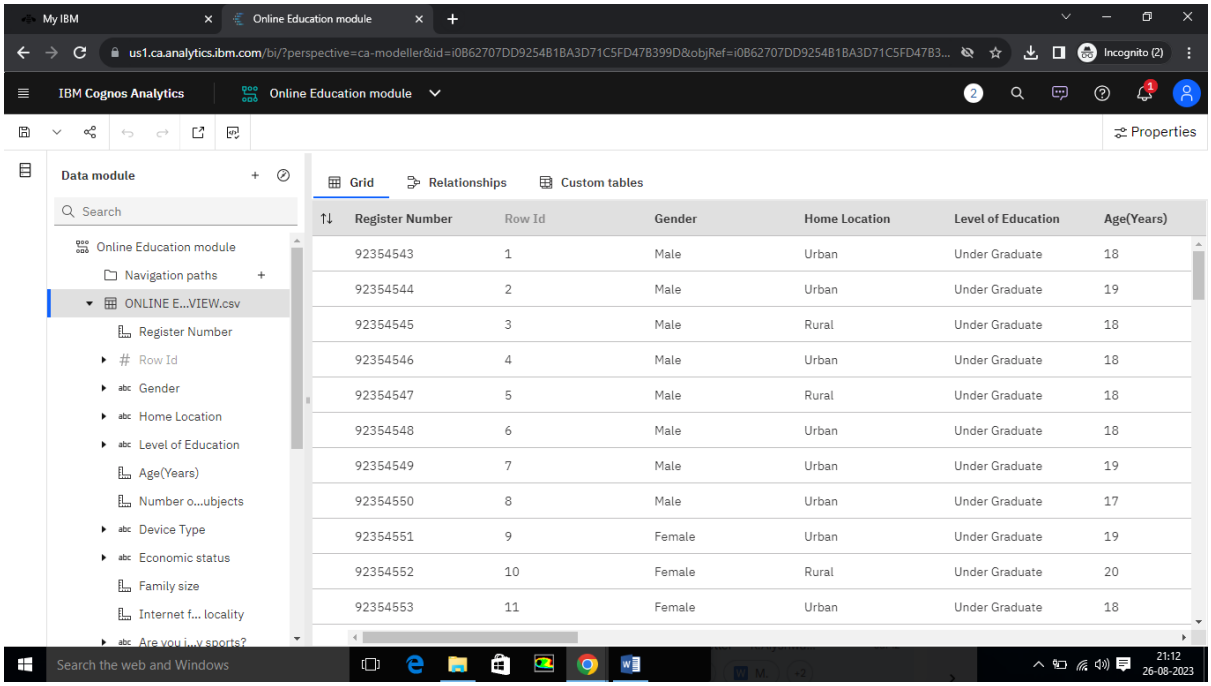

Figure 3. Online Education System Review dataset viewed in the IBM Cognos Analytics Tool

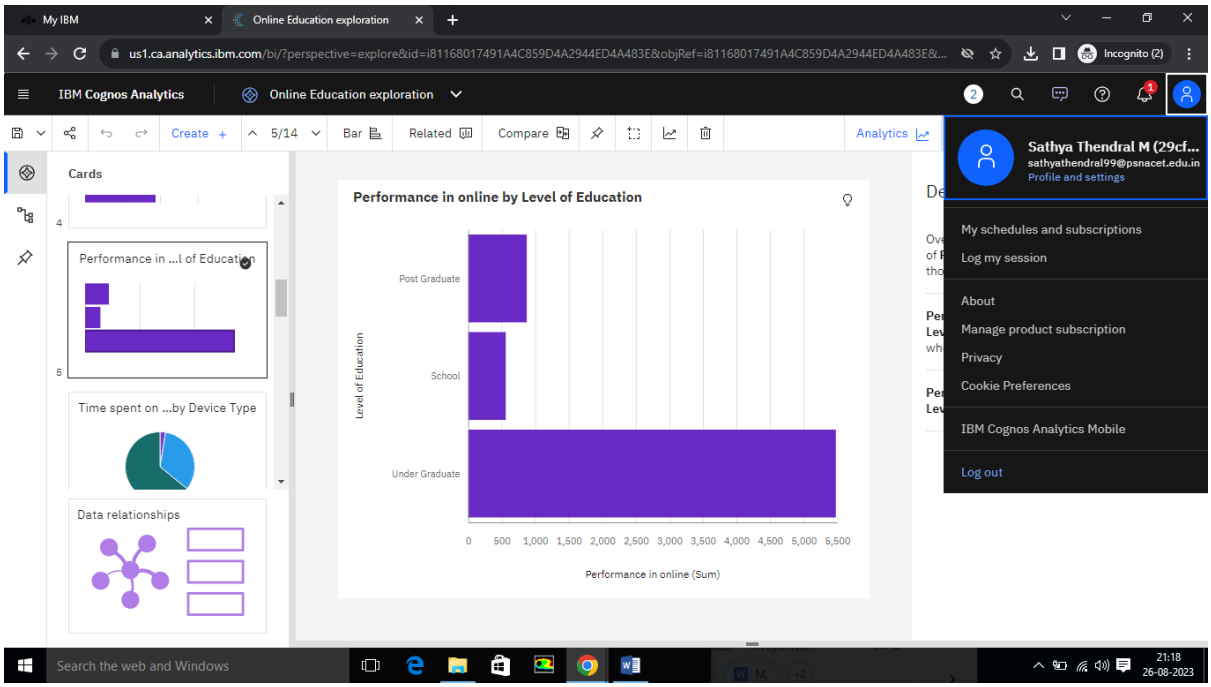

Figure 4. Performance in online Vs Level of education plotted using IBM Cognos Analytics Tool

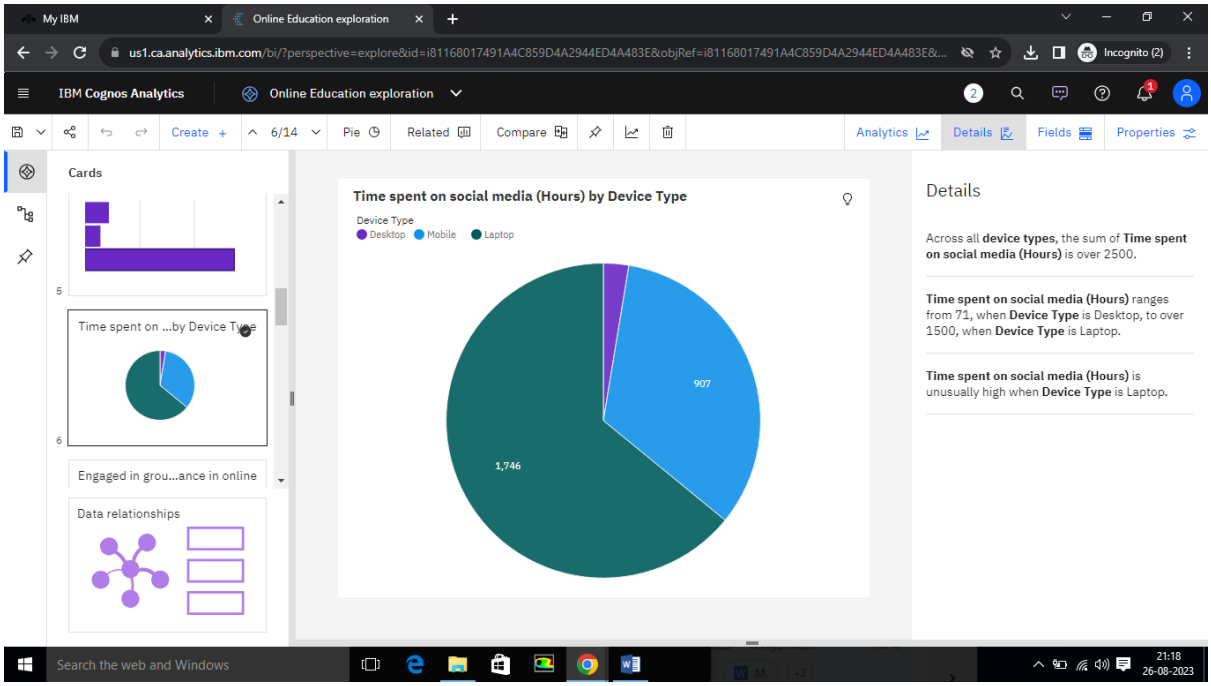

Figure 5. Time spent on social media Vs Device type plotted using IBM Cognos Analytics Tool

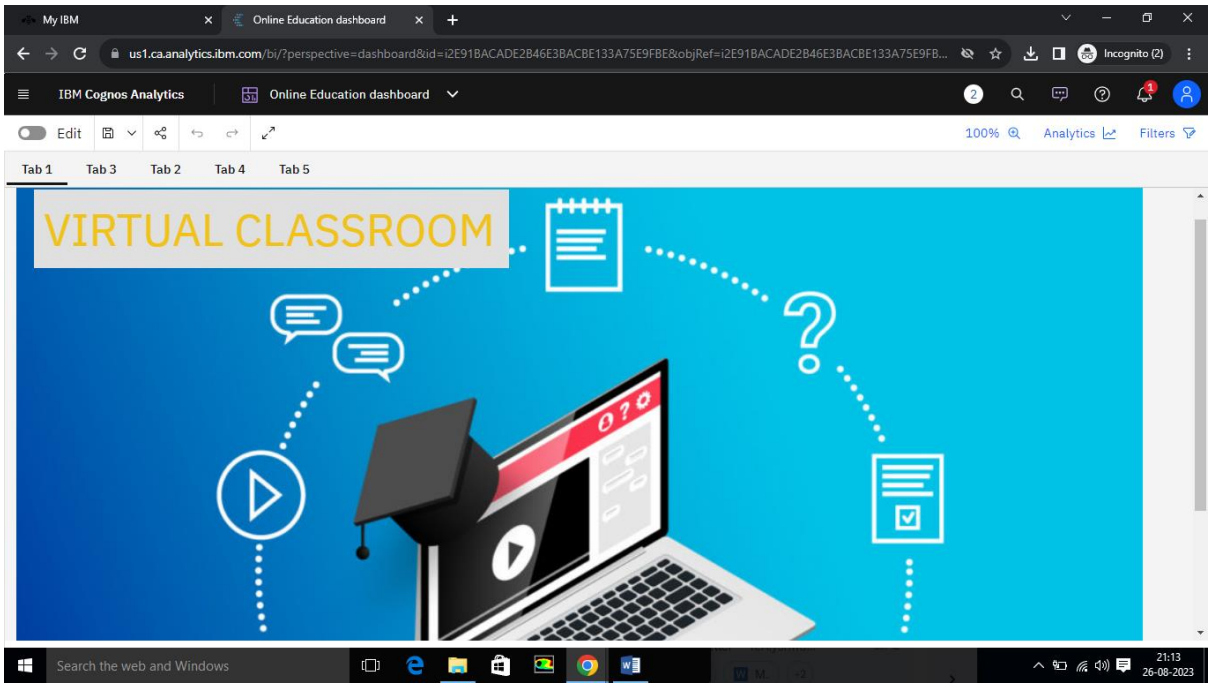

Figure 6. Dashboard showing several widgets on Tab 1 using IBM Cognos Analytics Tool

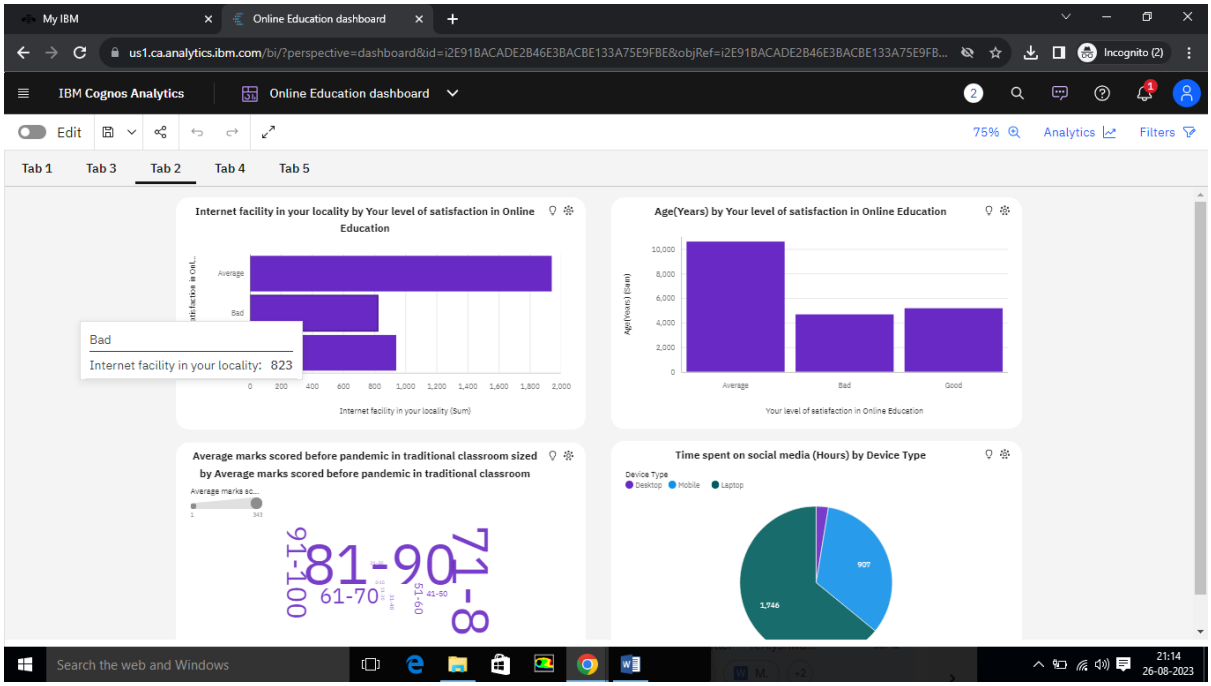

Figure 7. Dashboard showing several visualizations on Tab 2 using IBM Cognos Analytics Tool

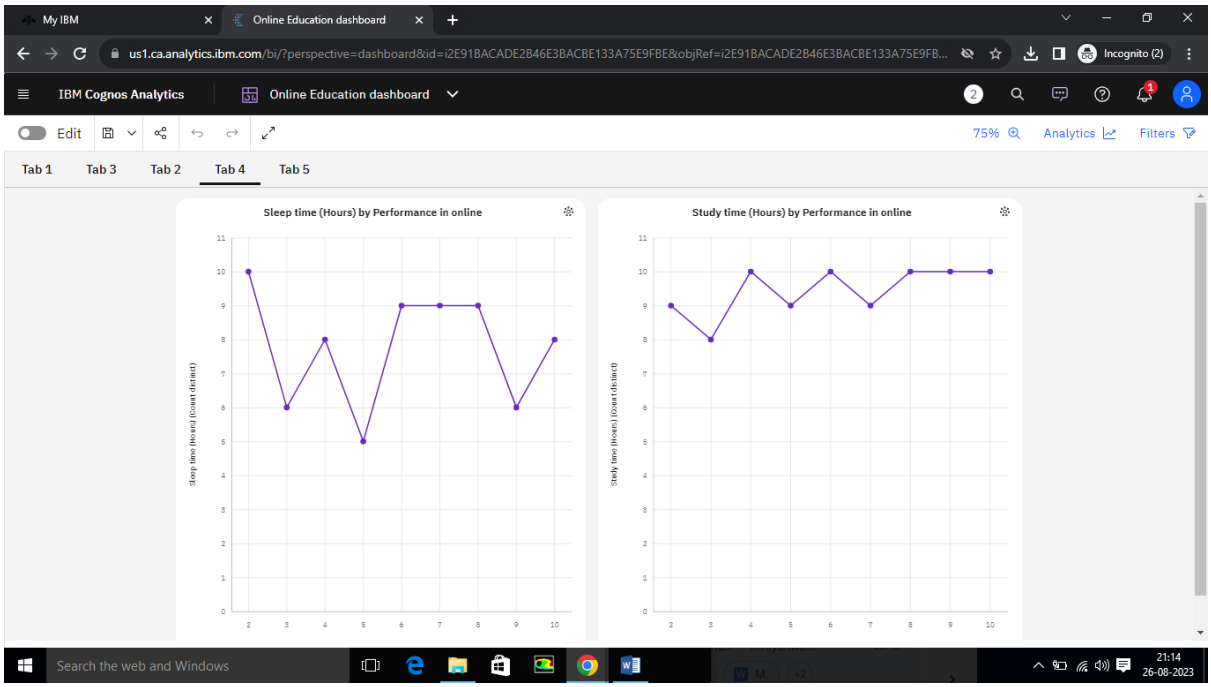

Figure 8. Dashboard showing several visualizations on Tab 4 using IBM Cognos Analytics Tool

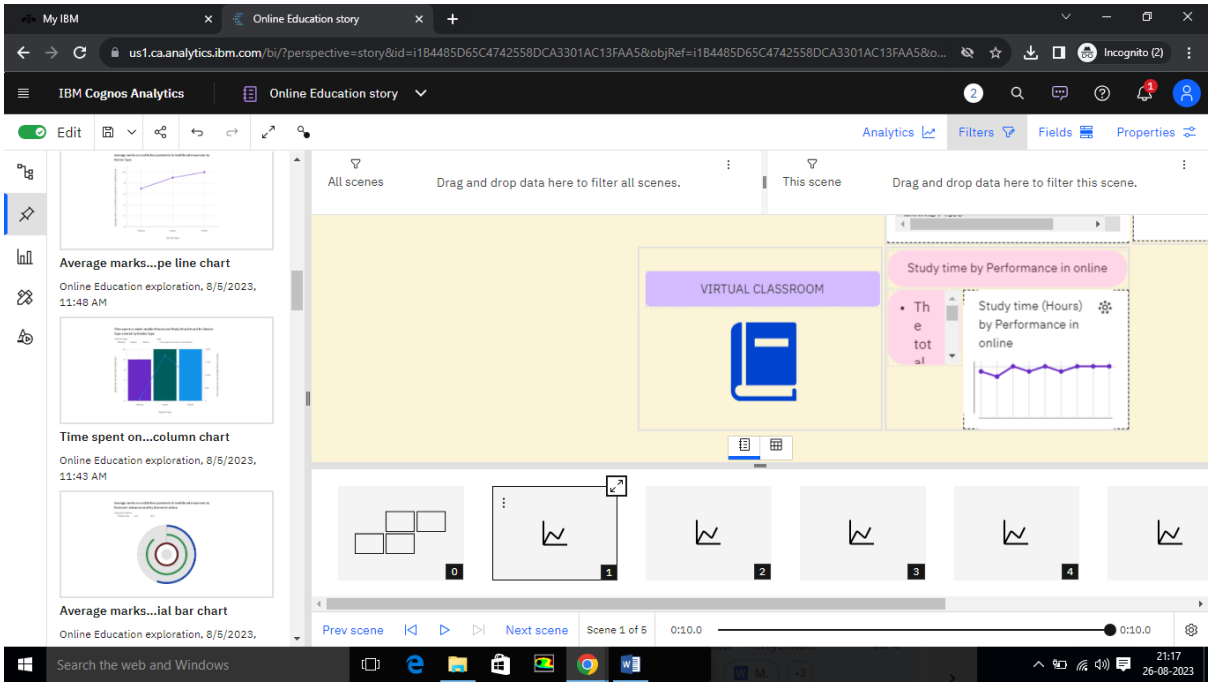

Figure 9. Story created using IBM Cognos Analytics Tool

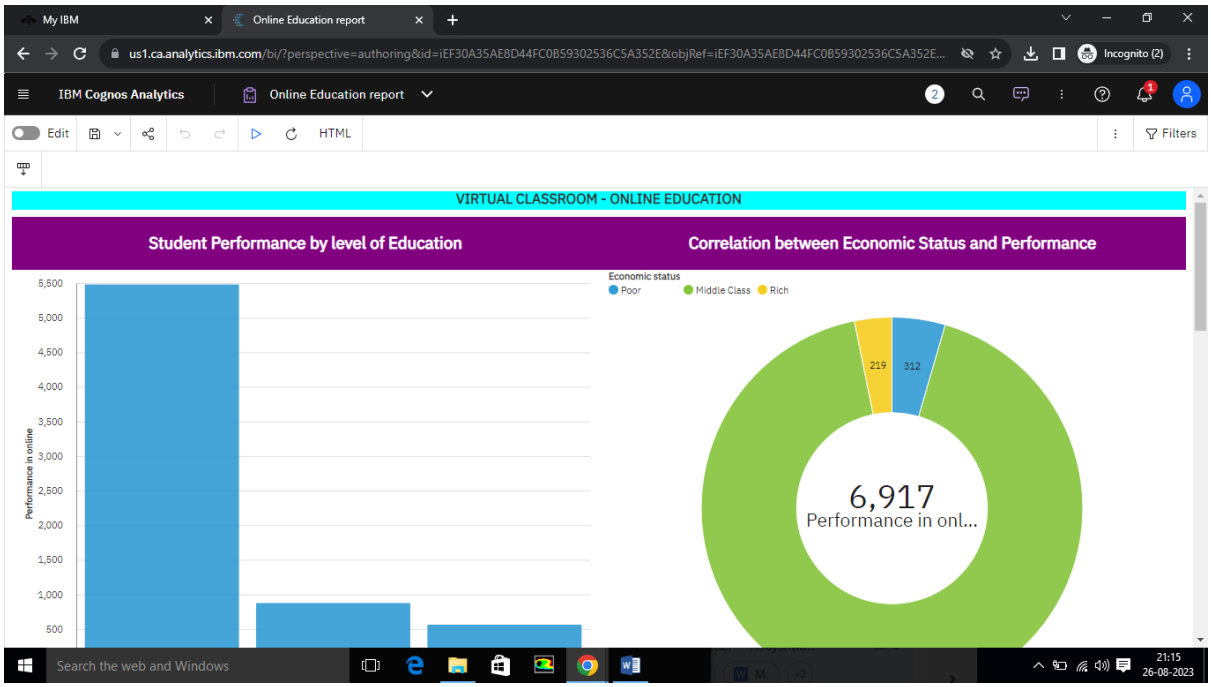

Figure 10. Report generated using IBM Cognos Analytics Tool

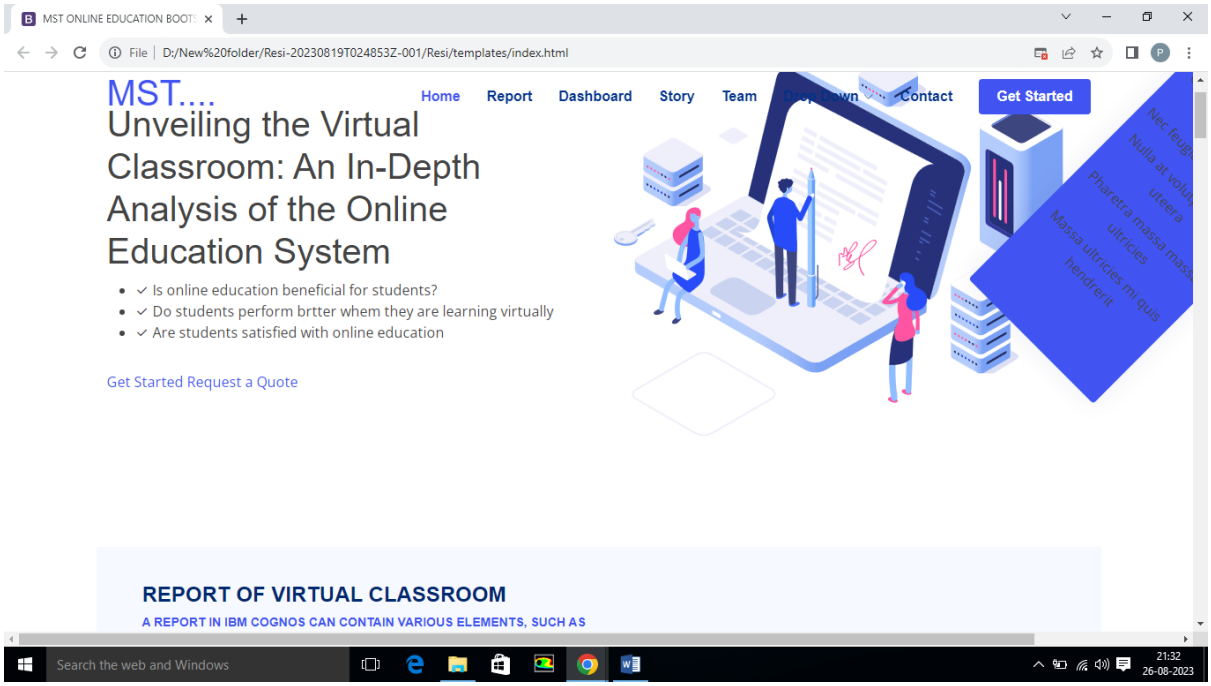

Figure 11. Snapshot of website showing the dashboard, story and report of the case study implemented using IBM Cognos Analytics Tool

7. ADVANTAGES & DISADVANTGES

There are many benefits of using IBM Cognos Analytics to improve online education. In order to create more productive learning environments, educators use data-driven insights to guide decisions about teaching strategies, resource allocation, and student support. Customized learning routes based on student preferences offer personalized learning experiences, while predictive models enable prompt interventions for difficult students, increasing success rates. Interactive dashboards that provide real-time monitoring improve teachers' capacity to evaluate student progress and course effectiveness. The proposed system, though, may have difficulties handling sophisticated data integration, dealing with privacy issues, spending money on training, and striking a balance between technical proficiency and conventional teaching methods. A successful integration that fully utilizes the platform's potential to promote online education requires careful assessment of these benefits and drawbacks.

8. APPLICATIONS

IBM Cognos Analytics improves online education. It enables teachers to develop individualized learning strategies for each student and to assist difficult pupils earlier. The software also assists schools in monitoring student growth and judicious resource use. It aids teachers and schools in making wise judgments by using cool images to convey crucial information. It enhances instruction, evaluates its effectiveness, and involves everyone in learning. Additionally, it gives teachers new skills and tailors instruction to each student.

Online learning is improved with IBM Cognos Analytics in both satisfaction and effectiveness.

9. CONCLUSION

The review of the online education system highlights both its advantages and disadvantages. It also adds new information from IBM Cognos Analytics. This improved comprehension provides insightful information regarding the crucial accessibility, educator preparation, and student involvement factors. By leveraging the power of IBM Cognos Analytics, data-driven strategies are unlocked to optimize these elements, thus elevating the overall effectiveness of virtual classrooms.

10. FUTURE SCOPE

Future applications of IBM Cognos Analytics to improve online education show bright prospects for development. The use of AI capabilities has the potential to usher in a new era of adaptive learning systems, seamlessly adjusting the pace and content to suit the individual needs and learning preferences of each student.

Additionally, by sharing data-driven insights with parents and other stakeholders, an educational ecosystem that is more collaborative and engaged can develop, increasing kid's online learning experiences. Additionally, the fusion of virtual reality (VR) and augmented reality (AR) technology is set to transform online education by providing immersive and interactive learning experiences that engage and inspire students in ways that have never before been possible.

11. BIBILOGRAPHY

1. Walker, S.M., 2023. Can the Use of Instructor Self-Disclosure Influence Collective Resilience in the Virtual Classroom During the COVID-19 Pandemic?. In Female Academics' Resilience during the COVID-19 Pandemic: Intercultural Perspectives (pp. 273-293). Cham: Springer International Publishing.
2. Khanal, J., 2023. Shifting identities: an examination of student perceptions and experiences in face-to-face and online learning in Nepal. Education and Information Technologies, pp.1-29.
3. AlQaheri, H. and Panda, M., 2022. An education process mining framework: Unveiling meaningful information for understanding students' learning behavior and improving teaching quality. Information, 13(1), p.29.
4. Cui, Y., Ma, Z., Wang, L., Yang, A., Liu, Q., Kong, S. and Wang, H., 2023. A survey on big data-enabled innovative online education systems during the COVID-19 pandemic. Journal of Innovation & Knowledge, 8(1), p.100295.
5. Montes-Iturrizaga, I., Zambrano Aranda, G.M., Pamplona-Ciro, Y.L. and Villalba-Condori, K.O., 2023. Perceptions about the Assessment in Emergency Virtual Education Due to COVID-19: A Study with University Students from Lima. Education Sciences, 13(4), p.378.