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Streamlining Student Management with Power BI

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ABSTRACT

This project presents the development of a Student Management System utilizing the advanced functionalities of Power BI. The system efficiently organizes and visualizes key student information, including personal details such as name, father's name, mother's name, Aadhar number, PAN number, and eligibility number. Additionally, it incorporates academic performance indicators such as 10th and 12th-grade percentages, as well as cumulative grade point averages (CGPA) for First Year (FE) and Second Year (SE) courses. By integrating these diverse datasets into a centralized platform, stakeholders can gain comprehensive insights into student profiles and academic achievements. The visualization capabilities of Power BI facilitate data-driven decision-making processes, empowering educational institutions to enhance student support mechanisms and optimize academic outcomes.

Keywords: Framework, Dashboard, Management, Data Visualization, Analysis, etc.

INTRODUCTION

Business Intelligence (BI) in education and its application in student data analysis. Power BI, a powerful BI tool, offers a range of benefits for educational institutions in managing student information effectively. In the realm of education, the integration of Business Intelligence (BI) tools like Power BI has revolutionized the management of student data and academic processes. Power BI, a Microsoft product, empowers educational institutions to harness the power of data visualization and analytics to enhance decision-making and optimize educational outcomes. By leveraging Power BI, schools can delve into vast datasets, simplify administrative tasks, and gain actionable insights to support students and educators effectively.

The utilization of Power BI in a student management system offers a comprehensive approach to handlingstudent information, academic performance, resource allocation, and strategic planning within educational settings. Through the creation of interactive dashboards, schools can track student progress, identify trends, predict outcomes, and improve overall educational practices. Moreover, the implementation of Power BI facilitates efficient data-driven decision-making, enabling educators and administrators to address challenges proactively and enhance the learning experience for students.

This introduction sets the stage for exploring the transformative impact of Power BI in education, particularly in the context of student management systems, emphasizing the role of data analytics in shaping a more efficient and student-centric educational environment.

LITERATURE REVIEW

Business intelligence (BI) is defined as the translation of information contained in knowledge that enables us to provide appropriate information to a specific user at the right time to support real-time decision making. As a result, BI brings together a variety of tools and technologies that enable data collection, integration, analysis, and visualization. To deploy a BI platform, various intermediate processes, such as the creation of a Data Warehouse, must be completed, which is common in the development of this type of software tool (DW) [1]. In this case, the Kimball process was used to design, develop, and deploy the DW. As a result, several of these steps, such as task planning and expected results, describing the architecture that will follow the BI system, selecting and installing the most appropriate BI tool, building the Data Warehouse dimensional model, the Extraction, Transformation, and Loading (ETL) process, and finally developing the BI application, are known to be critical for the successful implementation of a BI system [1].

After the previous is done, literature selection was performed by selecting based on title and year of publication. The

purpose of literature title selection is to identify whether it fits the field of business intelligence in higher institutions or not. At the same time, a condition in a range 2000 to 2020 is limited for the selection of literature. Once the literature was identified and selected, the leftover literatures are performed a review.

Sustainability of according to research were examined as well as the availability of literatures in completetext. [2] also stated that chosen literature will be studied and there will be 14 articles to be discussed. After the previous is done, literature selection was performed by selecting based on title and year of publication. The purpose of literature title selection is to identify whether it fits the field of business intelligence in higher institutions or not. At the same time, a condition in a range 2000 to 2020 is limited for the selectionof literature. Once the literature was identified and selected, the leftover literatures are performed a review. Sustainability of according to research were examined as well as the availability of literatures in completetext. [2] also stated that chosen literature will be studied and there will be 14 articles to be discussed.

First and foremost, one of the main strengths analyzed from the proposed previous work is that they madegood use with the adoption of business intelligence tool for analyzing variable data could contribute to taking better and informed decisions. Other than that, the results of the data analysis are well presented indetailed in different forms of graphical objects which includes bar and pie charts, performance indicators,tables, and list boxes as well. Therefore, the decision making is based on dashboards, scorecards, and reports, which allows graphical sharing of vital data with the stakeholders.

In this matter, a good BI dashboard allows you to monitor and measure business performance and metrics.BI dashboard tools offer real-time centralized access to users enabling them to interact with and evaluate information, assisting them to make smarter, data-driven decisions. Hence, an appropriate business intelligence tool is chosen which is Qlik Tech where it brings data and analytics together seamlessly withthe only end-to-end, real-time analytics data pipeline. Limitation of the previous work Based on my findings on the proposed previous work, it is found that there are several limitations or weaknesses of implementation of BI tools in the education industry.

One of the very main issues is that CLO (Course Learning Outcomes) of students is not analyzed. CLO isvery crucial in terms of student academic performance as it observe or measure results that are expected after a learning experience rather than seeing from academic results. While a student's result does not accurately indicate the understanding of student in certain courses, CLO must be analyzed to gain insightsof what the student have learnt throughout the semesters.

Furthermore, just a little amount of data is collected, resulting in low data quality. Due to the restricted amount of data available, this could have an impact on decision-making, as data correctness relates to howwell it describes the real-world situations it is intended to describe. Inaccurate data will cause problems because it will lead you to make the wrong judgement. Because those findings and justifications are founded on erroneous data, the actions, and decisions you make based on them may not have the desired results. For example, data may lead a marketer to believe that the bulk of their clients are females in theirtwenties. Because their consumers are largely males in their 40s, and their data is inadequate and erroneous, they will wind up targeting the wrong demographic with their marketing, resulting in poor decision making.

To begin, I propose that the problem be solved by selecting and executing the appropriate business intelligence software tool. To pick the best BI tool among many available solutions on the market, you must first determine what kind of features are necessary or compulsory needed and which are not criticalto the company's demands.

So, should we go with a basic solution for everyday use or go for a more advanced platform with highly specialized and advanced features? The solution is not direct, and towards the completion of this article,I will expand on and justify a few of the options. Second, most today's BI solutions (>90 percent) providebasic (standard) capabilities such analyzation of data, ad-hoc reports, dashboards, visualization of data, performance metrics, adhoc query, ad-hoc analysis, and key performance indicators (KPIs). When selecting a BI solution, we must keep in mind that certain complex platforms with more advanced or specialized capabilities may not have all the basic features.

As a result, there are various compromises between advanced functionality and the breadth of business intelligence tools. It's not unheard of for a product to make use of basic or advanced capabilities from other solution providers.

METHODOLOGY

The case study approach involves an in-depth examination of a specific educational institution or organization to understand how Power BI is integrated into its student management system. This methodology allows researchers to gain

detailed insights into the implementation process, challenges faced, strategies employed, and outcomes achieved.

- **Selection of Case Study**

The first step in this methodology is to select a suitable case study institution that has implemented Power BI in its student management system. The selection criteria may include factors such as the size of the institution, the scope of the Power BI implementation, the availability of relevant data, and the willingness of the institution to participate in the study. Once a case study institution is selected, researchers can obtain consent and access to relevant data and stakeholders for the study.

- **Data Collection**

For the case study, data collection involves gathering information from multiple sources, including interviews, documents, observations, and artifacts. Semi-structured interviews can be conducted with key stakeholders involved in the Power BI implementation, such as administrators, IT staff, educators, and students. These interviews can explore various aspects of the implementation process, including the motivations for adopting Power BI, the selection and customization of features, the integration with existing systems, training and support provided, challenges faced, and outcomes achieved.

In addition to interviews, researchers can collect documents related to the Power BI implementation, such as project plans, implementation reports, training materials, and system documentation. Observations of the system in action and artifacts such as dashboards, reports, and data visualizations can also provide valuable insights into how Power BI is used in practice and its impact on decision-making processes.

- **Data Analysis**

The data analysis for the case study involves organizing, synthesizing, and interpreting the collected data to identify patterns, themes, and insights related to the integration of Power BI into the student management system. Thematic analysis can be used to analyze interview transcripts and identify recurring themes and patterns in the data. Document analysis can help uncover key events, decisions, and outcomes related to the Power BI implementation. Cross-case analysis may also be conducted to compare and contrast findings across multiple case study institutions, thereby providing broader insights into the implementation process and its outcomes for validation.

To ensure the validity and reliability of the case study findings, researchers can employ various strategies, such as member checking, triangulation, and peer debriefing. Member checking involves sharing preliminary findings with key stakeholders to validate the accuracy and completeness of the data. Triangulation involves comparing findings from multiple sources or methods to corroborate results and enhance the credibility of the findings. Peer debriefing involves seeking feedback from colleagues or experts to ensure the rigor and trustworthiness of the research process reporting.

The findings of the case study are typically presented in a detailed report that describes the case study institution, the Power BI implementation process, the challenges faced, the strategies employed, and the outcomes achieved. The report may include excerpts from interviews, examples of documents and artifacts, and data visualizations to support the findings. Recommendations for other educational institutions considering similar Power BI implementations may also be provided based on the lessons learned from the case study.

RESULTS

Certainly! Utilizing Power BI for student performance analysis can provide valuable insights for teachers and school administrators. Let's explore some ways to create a student management system using Power BI:

Here are some features of this dashboard:

1. Attendance Tracking: View attendance percentages and track enrollment by the total number of students.

2. Exam Results: The "Examination result by branch" column chart displays students' exam results by subject, and users

can track the average score for each subject.

3. Gender Breakdown: The "Student count by grade and gender" widget shows the total numberof students by grade, and clicking on bars provides additional information on male and female student counts.

4. Student Details: The "Student details" widget helps track individual student data, includingname, gender, grade, GPA, average marks, and attendance percentage.

5. Customizable Filters: Users can customize the dashboard by selecting specific years and grades using drop-down filters.

This dashboard provides a comprehensive view of student performance trends over time and helps identify areas for improvement.

Personalized Instruction:

1. Import student data from Excel into Power BI to create visually impactful and interactive dashboards.

2. Adjust criteria to gain insights into student needs and implement effective learning plans.

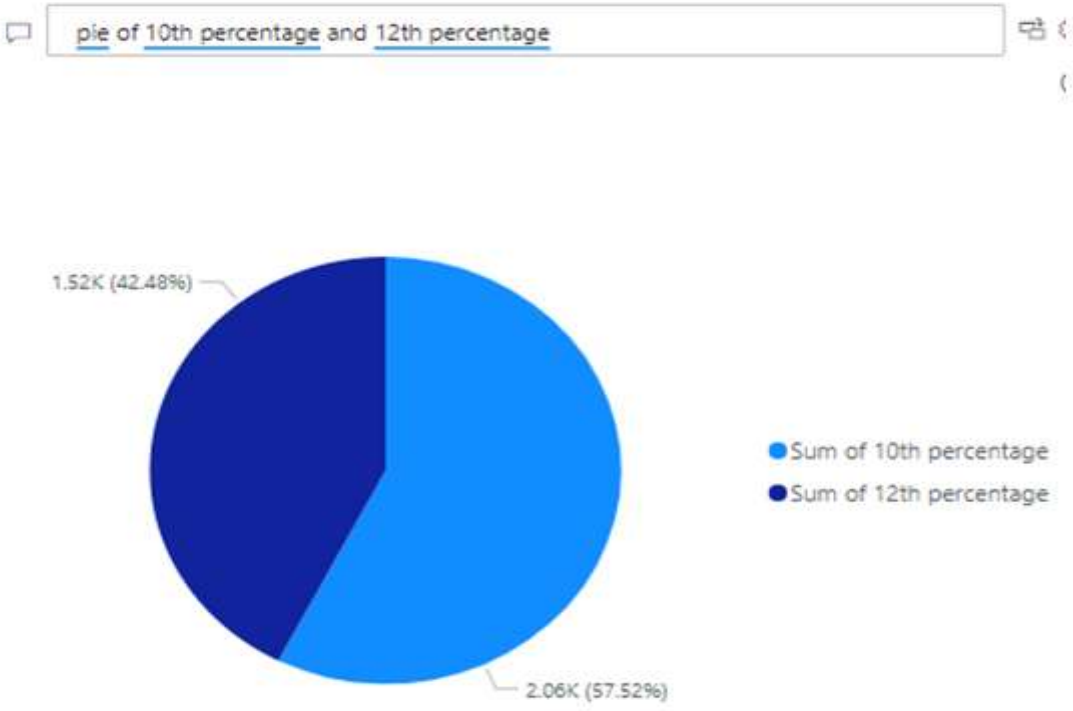
Course Analysis:

1. Use BI dashboards to evaluate course effectiveness and student outcomes.

2. Consolidate data for trend analysis among student cohorts and courses.

Remember that Power BI allows you to create customized dashboards based on your specific requirements, making it a powerful tool for managing student performance and enhancing educational outcomes.

Pie Chart :-



Above Pie Chart Describes the information of singe student 10th & 12th Percentage

CONCLUSION

In conclusion, this study has provided us an intelligence tool that can be used to create interactive dashboard and reports.

Our student management system powered by Power BI represents a transformative tool for educational institutions seeking to optimize student management processes and drive academic excellence. By leveraging the capabilities of Power BI, institutions can harness the full potential of their student data to improve decision-making, enhance student outcomes, and ultimately, shape the future of education.

As a conclusion, the findings based on performed data analysis on the results of students have been identified as well as the area of weaknesses of students. It is proven that business intelligence plays a verysignificant role in education especially into improving students' performance. By undergoing data analysisusing BI tools, higher educational institution able to use the collected data gathered and visualized them into a graphical representation to extract valuable insights into solving the problem. And by having this information extracted, it enables universities to perform better at important decision makings.

The study findings given in this research show that using Business Intelligence tools to analyze existing data and derive valuable information for decision making has a lot to promise. Students are also expectedto improve their ways of learning instead of relying on the notes and learning materials provided by lecturer. The materials itself are insufficient to gain full understanding on the subject. More practice and self-experimenting on coding is required to equip with the knowledge to place themselves more competitive.

Furthermore, the bloom taxonomy contributed much beneficial outcomes by outlining the learning objectives for students and lectures to further understand the purpose of the course. With it, student's weaknesses are justified based on the domains and able to find out which area they poorly performed at. Besides, by getting additional data to the original dataset, the student performance analysis might be significantly enhanced.

For instance, it will be informative to see and compare the results of how other students performed in the other university courses they take during the semester to enhance the further analysis and discovering greater insights. This will aid in a greater understanding of the students' performance and learning capabilities. Finally, leading educational institutions throughout the world must employ innovative methods to tackle the problems and new possibilities that have arisen. Also, the overall research of this project has proven that gender, program studied, background experience has a significant impact on the student's performance. The implementation of advanced analytical techniques, such as business intelligence (BI) systems and data mining tools and techniques, allows for more substantial use and analysis of obtainable university data, resulting in much more effective and efficient.

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