DATA ANALYTICS ON WEB-BASED DOCUMENT NOTIFICATION SYSTEM

Joana Rose Mae U. Reyes[1*], Domingo V. Origines Jr, ItD.[2]
Davao Del Sur State College[1], Davao Del Sur State College[2]
*Correspondence Email: joanareyes83@gmail.com, dvorigines@dssc.edu.ph

ABSTRACT

This study aimed to address the inefficiencies associated with manual document submission by providing and implementing data analytics within a web-based document notification system. The project also aimed to deliver a user- friendly data analytics dashboard, presenting submitted document data through various visualizations such as count metrics, bar graphs, and tables. This approach holds promise in enhancing decision-making processes, operational efficiency, communication, and collaboration within organizations. Descriptive data analytics methodology was employed to effectively summarize and present data points. Moreover, the project adopted the Rapid Application Development methodology for its development. The project received favorable evaluations from its assessors, attaining high ratings with an overall mean score of 4.17 for functionality, 3.95 for reliability, and 3.98 for usability. Consequently, it successfully achieved its objective of integrating descriptive data analytics into the document notification system. This implementation notably benefited the Human Resource Management Office of Davao del Sur State College by furnishing an analytical dashboard equipped with visualizations such as count metrics, bar graphs, and tables. Furthermore, the system facilitated seamless information updates, empowering administrators to make evidence-based decisions and discern trends within their data.

KEYWORDS

Descriptive data analytics, web-based, evidence-based decisions, rapid application development

INTRODUCTION

His template T Data analytics involves the examination of raw data to derive meaningful insights and conclusions. Frankenfield (2023) suggests that it encompasses a broad array of analytical techniques aimed at improving processes and uncovering latent trends. Beyond pinpointing production bottlenecks, data analytics is crucial for enhancing business performance. Incorporating it into their operational framework enables companies to streamline processes, manage large datasets efficiently, and ultimately reduce costs. Moreover, data analytics facilitates informed decision-making, enables the analysis of customer trends and satisfaction, fostering the creation of innovative and superior products and services. Kalsbeek (2020) categorized data analytics into four types: predictive analytics, prescriptive analytics, diagnostic analytics, and descriptive

data analytics. This study falls under descriptive data analytics, which provides a retrospective analysis of an organization's operations.

According to Laukkonen (2023), a notification system comprises a series of protocols and procedures involving both human and computer elements. Its core purpose is to notify individuals about specific events. Simple notification systems are deployed across various devices, including computers, phones, and other gadgets, to alert users about incoming text messages, emails, and other relevant events. Furthermore, notifications are instrumental in keeping individuals informed about pertinent information. Santiago (2017) emphasizes that notification design encompasses various types, such as user- generated notifications, push notifications, context-generated notifications, system- generated notifications, and passive notifications.

Currently, the Human Resource Management Office at Davao del Sur State College lacks a document notification system integrated with data analytics. The absence of data analytics may impede the organization's ability to make decisions grounded in evidence and could result in missed opportunities for advancement. It could also pose challenges in recognizing data patterns or trends, leading to inefficiencies and diminished competitiveness within the organization. Furthermore, without data analytics, tracking performance metrics and pinpointing areas for enhancement may prove challenging, hindering the organization's capacity to innovate and adapt to evolving circumstances.

Therefore, the proponent devised and implemented a data analytics-infused web-based document notification system tailored for the Human Resource Management Office at Davao del Sur State College. This system facilitated easy online document submission for personnel, with documents stored in a MySQL database. Moreover, data analytics functionality was incorporated to enable administrators to access statistical reports for each semester based on document submission activity. The system visualized data through count metrics, bar graphs, and tables, ensuring administrators could effortlessly stay informed and rely on accurate data. Consequently, this initiative empowered the HR department to make evidence-based decisions and discern patterns or trends within their data.

Conceptual Framework of the Study

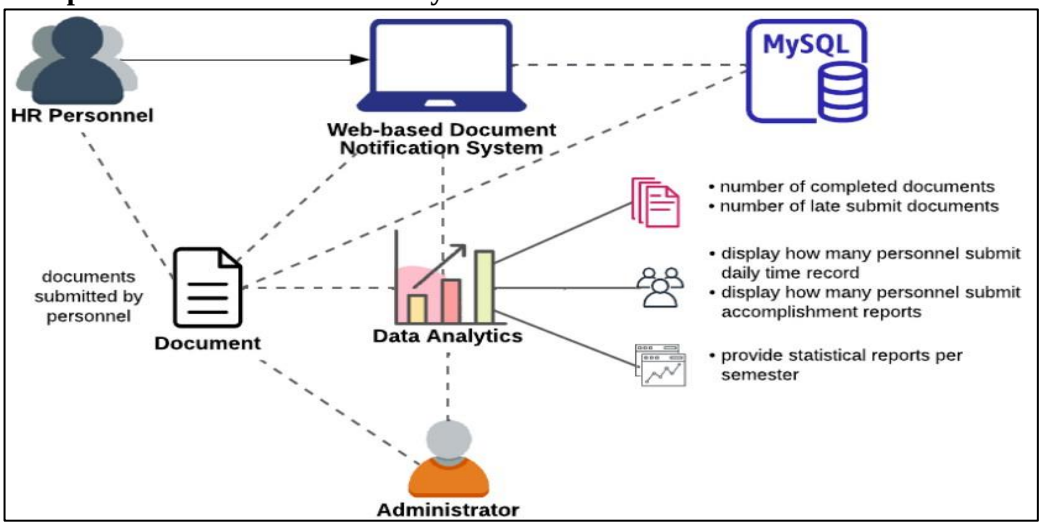

Figure 1. Conceptual Framework of the study

The figure 1 shows the conceptual framework of Data Analytics on Web-based Document Notification System. The figure below shows that the researcher implemented four features: (1) Provide statistical reports on a semester-by- semester basis; (2) Display

how many personnel submit each document; (3) Display how many complete documents were submitted; and (4) Display how many late documents were submitted. The data will be visualized using count metrics, bar graph, and tables. In addition, the data of submitted documents will be recorded and displayed on the administrator page where the data analytics was implemented and the results can be viewed by each semester. Furthermore, all data was saved and stored in MySQL database. The technique mentioned above was observed and tested while using the system.

RESEARCH METHOD

Research Design

The Figure 2 illustrates the utilization of the Rapid Application Development (RAD) methodology in the project's development process. This approach proved instrumental in identifying and resolving emerging issues encountered during the research and analysis phases. The selection of the RAD approach for this study stemmed from several advantages it offered: Firstly, it enabled swift delivery of the product. Secondly, by engaging users consistently throughout the product's lifecycle, it ensured product quality. Thirdly, RAD placed lesser emphasis on task planning and prioritized development and prototype creation. As highlighted by Venkata (2020), RAD techniques are particularly beneficial when building customer-facing portals or internal business tools, facilitating a quicker and improved end-user experience.

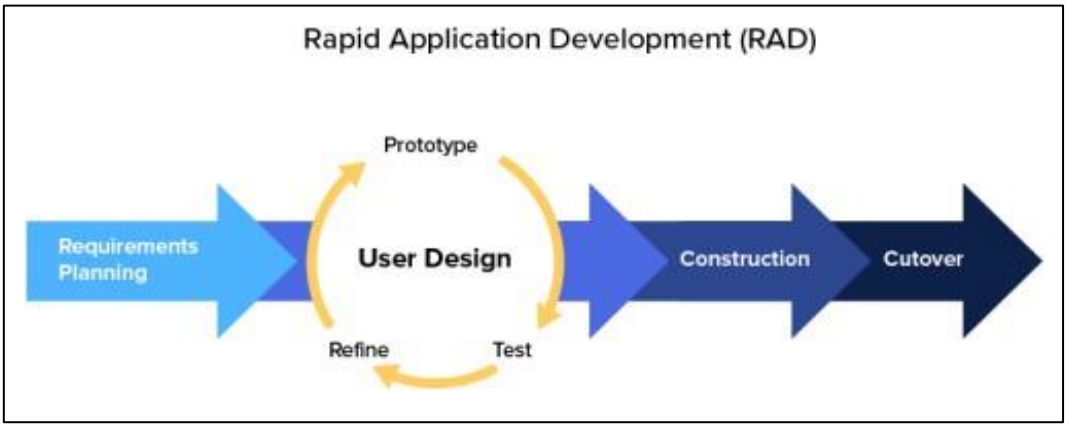

Figure 2. Rapid Application Diagram

System Requirements

Table 1 Software Requirements for System Development.

Software	Specification
Visual Studio 2012	Version 11.0
MySQL Workbench	Version 8.0.36
Windows 10	Version 22H2

The table above showed the following software that had been used to develop the project. A computer with the Windows 10 operating system was required for the use of other applications, as it allowed the software to run on this version. The Visual Studio was installed for the developer to be able to make the proposed Web- based application. Furthermore, the developer used the MySQL database since it was a reliable and powerful database management system that was well-suited for storing and managing data in many

types of applications. Its open-source nature, compatibility, scalability, and security features made it a popular choice for businesses and developers alike.

RESULT AND DISCUSSION

This section provides an in-depth examination and discussion of the outcomes of the capstone project titled "Data Analytics on Web-based Document Notification System." A meticulous analysis of the gathered data is presented, probing into its relevance to the research questions and objectives. This chapter holds paramount significance in the study, serving as the foundation for drawing conclusions and offering recommendations. Following this, the subsequent section delineates the specific findings derived from the study.

Provide statistical reports on a semester-by-semester basis

Figure 3 shows how the analytical dashboard offers valuable insights into the performance and productivity of HR personnel across time. By monitoring the quantity and categories of documents submitted per semester, it became feasible to discern trends and behavioral patterns among HR personnel. Such findings can inform decisions regarding HR personnel training, development initiatives, and the evaluation of current policies and procedures. In essence, the statistical reports furnish a quantitative overview of HR personnel performance, serving as a foundation for strategic decision-making to bolster organizational efficacy

.Figure 3. Provide statistical reports on a semester-by-semester basis

Display how many personnel submit Accomplishment Reports

The figure 4 shows a count metric for HR personnel submitting accomplishment reports to measure department performance. Management can track engagement, productivity, and effectiveness. Recognizing employee contributions can improve engagement and create a culture of accountability and transparency, leading to better outcomes for the organization.

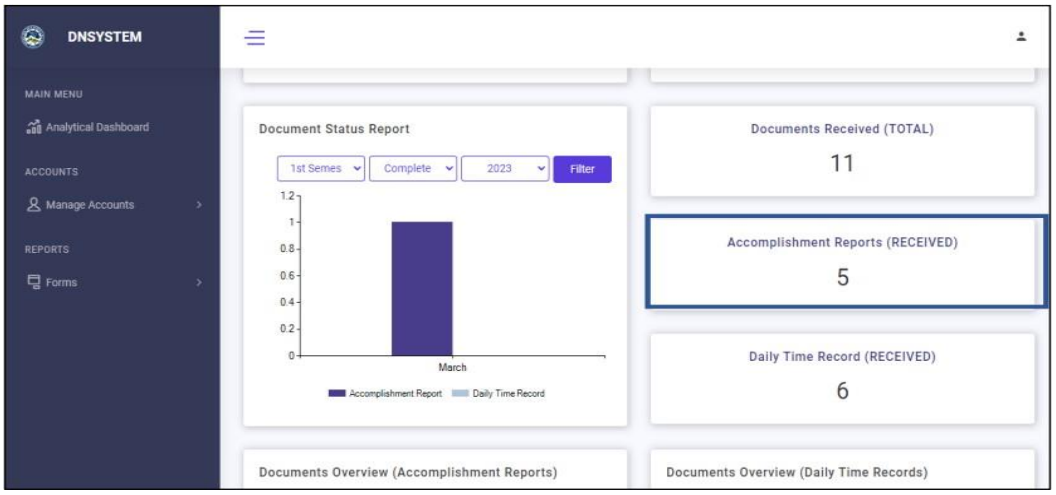

Figure 4. Display how many personnel submit each document such as Accomplishment Reports

Display how many personnel submit Daily Time Record

The figure 5 describes a webpage exhibiting the count of personnel who have submitted their Daily Time Records, offering a visual representation of the process and pinpointing areas that could be enhanced. This implemented webpage showcases the number of personnel submitting their Daily Time Records, serving as a count metric for assessing departmental performance within the HR personnel. Through this, management can monitor engagement levels, productivity rates, and overall effectiveness. Acknowledging employees' efforts fosters engagement and cultivates a culture of accountability and transparency, ultimately yielding favorable out-comes for the organization.

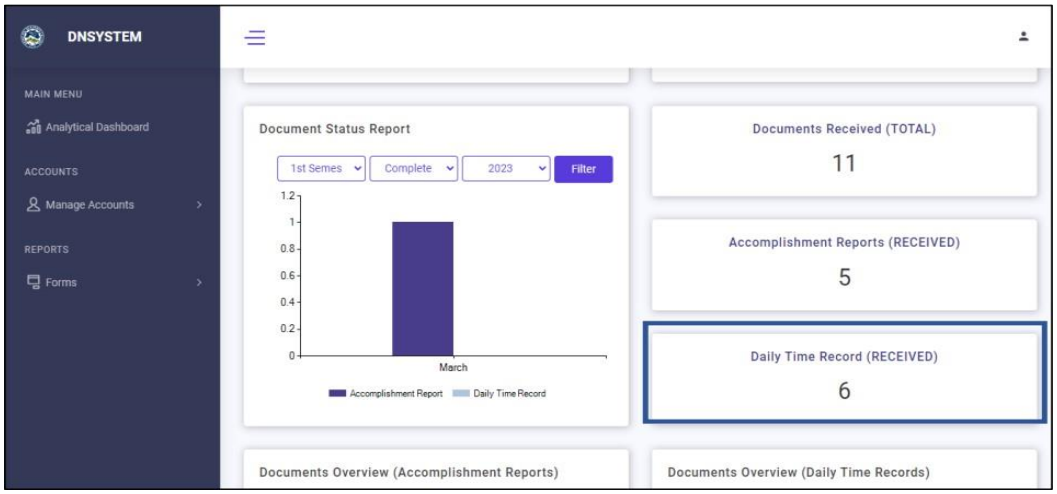

Figure 5. Display how many personnel submit each document such as Daily Time Record

Display how many complete documents were submitted

The figure 6 shows the web-page that displays how many completed documents submitted by personnel. The figure below shows a webpage that provides insight into an organization's document completion rate. Data on document completion can assist in identifying areas for process improvement. It can also be used for performance management. Administrator can identify high-performing employees as well as those who

are struggling to meet expectations by tracking the number of complete documents submissions.

Figure 6. Display how many complete documents were submitted

Display how many late documents were submitted

The figure below shows a webpage that provides insights into compliance with deadlines for document submissions within an organization. By tracking the number of late document submissions, administrators can identify areas where compliance issues may be occurring. Moreover, late document submission data can also help identify areas for process improvement.

Figure 7. Display how many late documents were submitted

Visualize data reports using count metrics

The figure 8 shows the visualized data using count metrics to provide the HR department with a clear and concise view of important metrics related to the performance of an organization, team, or individual. KPIs help identify areas of success and areas where improvement was needed, allowing the HR department to make informed decisions and take actions to improve performance. Visualizing data reports using KPIs is important because it improves understanding, facilitates efficient communication, enables better decision-making, promotes accountability, and helps to set specific, measurable goals.

Figure 8. Visualize data reports using count metrics

Visualize data reports using Bar graph

The figure 9 shows the webpage that visualized data reports using bar graph. As shown in figure below, the bar graph provides a clear and concise representation of categorical or comparative data, making it easier to identify patterns and trends in the data, compare and analyze different data points, and make data-driven decisions. It was important to visualize data reports using bar graphs because they are a popular and effective way to present data, allowing stakeholders to quickly understand and interpret data insights.

Figure 9. Visualize data reports using bar graph

Visualize data reports using Tables

As the figure 10 below shows, the visualizing data reports using tables was to present information in a structured and organized format that allows for easy interpretation and analysis, facilitating data-driven decision making; the importance lies in the ability to efficiently communicate complex information, highlight patterns and trends, and identify outliers or anomalies, ultimately aiding in better understanding and utilizing data. Overall, visualizing data reports using tables was a useful technique for

conveying complex information in a clear and concise manner. It helps to provide insights into large datasets and supports data- driven decision making.

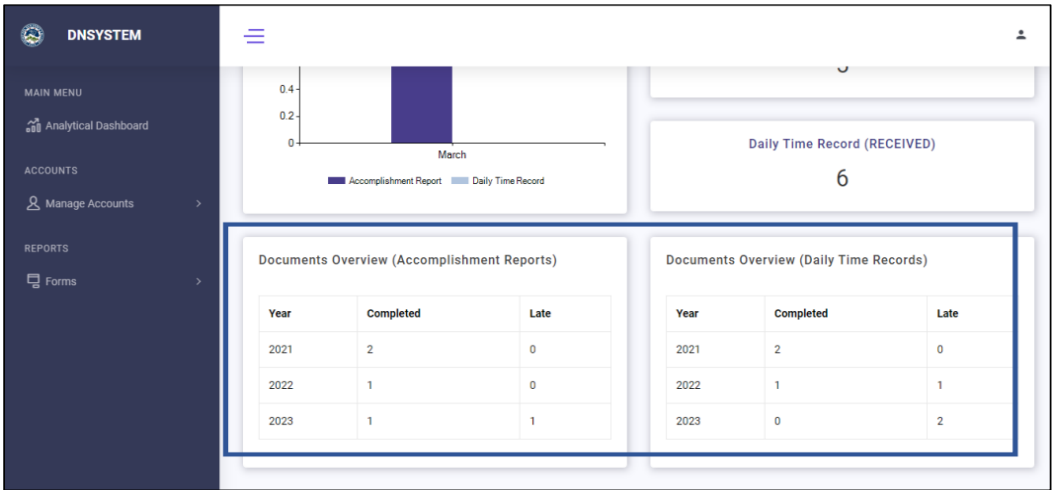

Figure 10. Visualizing data reports using tables

Table 7 Descriptive ratings from the respondents in terms of functionality of the system.

Particular	IT Expert	Panel	IT Student	HR personnel	Total Mean	Remarks
Can provide statistical reports on a semester- by-semester basis.	4	4.33	4.4	3.5	4.06	Good
Can Display how many personnel submit each document such as Accomplishment Report.	4	4.33	4.4	4.25	4.25	Good
Can Display how many personnel submit each document such as Daily Time Record.	4	4.33	4.4	4.25	4.25	Good
Can display how many complete documents were submitted.	4	4.67	4.6	3.75	4.26	Good
Can display how many late documents were submitted.	4.4	4	4.2	3.75	4.09	Good
Can Visualize data reports using count Metrics	4.2	4.33	4.2	3.75	4.12	Good
Can Visualize data reports using Bar graph.	4.2	4	4.6	3.75	4.14	Good
Can Visualize data reports using Table.	4.4	4	4.4	4	4.2	Good
Average	4.15	4.25	4.4	3.88	4.17	GOOD

As presented in Table 7, the overall mean descriptive rating for functionality provided by the respondents is 4.17, indicating a classification of "Good" (G). This signifies that the measure described in the item is satisfactory and fulfills most requirements; however, there remains room for improvement, suggesting that further enhancements could amplify its effectiveness. Notably, HR personnel assigned a lower rating to the project's functionality, expressing the belief that including a broader range of document types in the report would enhance the appreciation of the data analytics. This underscores the importance of expanding the scope of the report to encompass additional document types relevant to the organization, thus presenting a more comprehensive view of its data.

Furthermore, as highlighted by Selvam and Ponnusamy (2023), the successful implementation of business intelligence (BI) necessitates effective data management and analytics practices. It was crucial for businesses to leverage tools and methodologies that enable the extraction of valuable insights from data. This entails establishing robust processes and procedures for data collection, storage, and analysis.

Table 8 Descriptive ratings from the respondents in terms of reliability of the system.

Particulars	HR Personnel	Total Mean	Remarks
The system's statistical reports provided on a semester-by-semester basis is accurate.	3.5	3.69	Agree
The system can display the number of personnel who submit Accomplishment Reports accurately.	3.5	3.73	Agree
The system can display of the number of personnel who submit Daily Time Records accurately.	3.75	3.94	Agree
The system can display the total number of complete documents submitted accurately.	3.75	4.04	Agree
The system can display of the total number of late documents submitted accurately.	3.75	4.09	Agree
The system can accurately visualized data using count metrics.	3.75	3.91	Agree
The system can accurately visualized data using bar graph.	4	4.12	Agree
The system can accurately visualized data using tables.	4	4.07	Agree
Average	3.75	3.95	AGREE

The respondents' descriptive evaluations regarding the reliability of the project yield an overall mean score of 3.95, indicating that the measure was generally perceived as satisfactory with minor reservations. Nevertheless, there remain areas warranting improvement to better align with user requirements. Feedback from the IT panel underscores a perceived inadequacy in the system's data analytics capabilities, prompting the need for enhancements to meet their expectations. Furthermore, the IT panel's input emphasizes the necessity for improved system performance and quicker response times to facilitate efficient data analysis. Similarly, the HR staff's assessment of the system is lower, as they express the need for a broader range of document types to comprehensively capture the organization's data. This underscores the imperative of expanding the system's document type capabilities to provide a more encompassing understanding of the organization's data landscape.

As posited by Stedman and Vaughan (2022), data quality encompasses various factors such as accuracy, completeness, consistency, reliability, and timeliness. With the increasing integration of data processing in business operations and the heightened utilization of data analytics for decision-making, there has been a heightened emphasis on data quality in enterprise systems.

Table 9 Descriptive ratings from the respondents in terms of usability of the system.

Particulars	HR Personnel	Panel	Total Mean	Remarks
It was easy to find the statistical reports provided on a semester-by-semester basis.	3.25	4	3.96	Agree
It was easy to understand the information presented in the statistical reports provided on a	3	4.67	3.82	Agree

semester-by-semester basis.				
It was easy to find the display of the number of personnel who submit Accomplishment Reports.	3.5	4.67	4.09	Agree
It was easy to find the display of the number of personnel who submit Daily Time Records.	3.75	4.67	4.16	Agree
It was easy to understand the information presented in the display of the total number of complete documents submitted.	3	4.33	3.98	Agree
It was easy to understand the information presented in the display of the total number of late documents submitted.	3.5	4.33	4.06	Agree
It was easy to find the count metrics in the data reports.	3.5	4.33	4.06	Agree
It was easy to understand the information presented in the visualization of data reports using bar graphs.	3.25	4.33	4	Agree
It was easy to understand the information presented in the visualization of data reports using tables.	3.25	4.33	4	Agree
Average	3.28	4.41	3.98	AGREE

The ratings provided by respondents help evaluate the project's interface design and user experience. They offer valuable insights for identifying areas that need improvement to enhance usability. Analyzing these ratings enables developers to make informed decisions and improve user satisfaction. In terms of usability, the overall mean rating from respondents was 3.98, indicating a generally good and easy-to-use measure with minor areas for improvement. The HR staff rated the system's usability lower due to its lack of integration with their existing workflow. They already have a system in place for recording documents and are required to use it daily. Using our system as a backup or storage solution requires an additional manual step of scanning and uploading documents, which adds extra work to their workflow. However, they still find our system useful for backup and storage purposes but prefer a more integrated solution that streamlines their workflow.

According to Poursaba (2021), the implementation of a Document Management System (DMS) offers organizations various advantages, such as minimizing storage requirements, strengthening security measures, enhancing adherence to regulatory standards, simplifying document retrieval, and promoting improved collaboration. By optimizing document workflows, safeguarding sensitive data, ensuring compliance with regulations, facilitating efficient information retrieval, and encouraging teamwork, DMS contributes to heightened productivity and increased operational efficiency

Table 9 Overall ratings of the system.

Particular	Total Mean	Remark
Functionality	4.17	Agree
Reliability	3.95	Agree
Usability	3.98	Agree
Average	4.03	AGREE

The overall mean ratings for functionality, reliability, and usability, as indicated in the table above, reflect a positive sentiment among respondents (Dela Fuente, 2022). With an overall mean rating of 4.03, respondents expressed high satisfaction with the Data Analytics on Web-based Document Notification System, deeming it reliable, user-friendly, and functional. Nevertheless, there remains scope for improvement based on

feedback from various user groups. The constructive criticism provided by respondents will inform future enhancements aimed at ensuring better functionality, reliability, and usability of the system.

CONCLUSION

Based on the results of the study, The system successfully achieved the study's objectives by providing statistical reports on a semester basis, displaying the number of submissions for each document type (e.g., accomplishment report, daily time record), displaying how many late and completed documents were submitted, and visualizing data through metrics, bar graphs, and tables. Overall, all of the objectives of the study have been met.

REFERENCES

Dela Fuente, R. O. (2022). Faculty performance evaluation system with application of data analytics. South Asian Journal of Engineering and Technology, 121, 24-31. https://sajet.in/index.php/journal/article/download/182/251

Frankenfield, J. (March 14, 2023). Data analytics: What it is, how it's used, and 4 basic techniques. Investopedia. https://www.investopedia.com/terms/d/dataanalytics.asp#toc-what-is-data-analytics

Kalsbeek, R. (2020, December 21). Understanding the different types of analytics: Descriptive, diagnostic, predictive, and prescriptive. Iteration Insights. https://iterationinsights.com/article/understanding-the-different-types-ofanalytics/

Laukkonen, J. (2023, June 27). What is a notification system? Easy Tech Junkie. https://www.easytechjunkie.com/what-is-a-notification-system.htm

Poursaba, C. (2021, July 23). The top 7 benefits of document management systems. Meridian Blog. https://www.whymeridian.com/blog/the-top-7-benefits-ofdocument-management-systems

Santiago, S. V. (2017, June 17). A comprehensive guide to notification design. Toptal Design Blog. https://www.toptal.com/designers/ux/notification-design

Selvam, P., & Ponnusamy, P. N. (2023). Maximizing business intelligence: A framework for effective data management and analytics. Dogo Rangsang Research Journal, 13(4), 40–42. (https://www.researchgate.net/publication/369830419_MAXIMIZING_BUSINESS_INTELLIGENCE_A_FRAMEWORK_FOR_EFFECTIVE_DATA_MANAGEMENT_AND_ANALYTICS

Stedman, C., & Vaughan, J. (2022). Data quality. Data Management. https://www.techtarget.com/searchdatamanagement/definition/data-quality

Venkata, S. B. (2020, September 8). Why rapid application development (RAD) is important and when and how should you use it. Innominds. https://www.innominds.com/blog/why-rapid-application-development-rad-is-important-and-when-and-how-should-you-use-it