DATA SCIENCE AND DATA ANALYTICS: IMPACT ON DECISION-MAKING AND EVALUATION IN ELEMENTARY SCHOOLS

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Abstract

This research delves into the recent advancements in Data Science and Data Analytics and their impact on decision-making and evaluation practices in Elementary Schools. This study uses bibliometric analysis to scrutinize international scholarly literature related to Data Science, Data Analytics, Decision Making, Evaluation, and Elementary School from 2018 to 2023. Data from the Google Scholar Database unveils contemporary trends in information technology to enhance primary education. The bibliometric analysis highlights researcher collaborations, key emerging concepts, and the evolution of evaluation approaches in the Elementary School environment. These findings provide deep insights into how Data Science and Data Analytics influence educational decision-making and evaluation practices at the elementary level. In the context of elementary education, the research discusses the impact of information technology on classroom evaluation methods, paving the way for developing responsive curricula and innovative teaching approaches. This study offers a better understanding of how using Data Science and Data Analytics can enhance evaluation in Elementary Schools, providing a foundation for more effective and relevant decision-making in education. These findings enrich the scholarly literature in this field and guide researchers and educational practitioners to integrate information technology in improving the quality of primary education.

Keywords: *Data Science, Data Analytics, Decision Making, Evaluation, Elementary School*

I.   INTRODUCTION

In the realm of contemporary education, technology integration has revolutionized the decision-making and evaluation process in Primary Schools. Rapid advances in the fields of Data Science and Data Analytics have fundamentally changed the traditional education paradigm. This research undertakes a comprehensive exploration of the intersection between Data Science, Data Analytics, Decision Making, Evaluation, and Primary School education. Recent years have witnessed a significant shift in education towards utilizing data-driven insights to improve teaching methods, student learning experiences, and overall institutional effectiveness. Adapting educational practices to meet the evolving needs of students and educators requires a deep understanding of this dynamic transformation.

This research dives into the complex relationship between data-driven technologies and decision-making processes in educational institutions, particularly in the context of basic education. Through bibliometric analysis, this research systematically examines global scholarly discourse from 2000 to 2023, revealing emerging trends, collaborative initiatives, and transformative concepts that define the development of Data Science and Data Analytics in

primary education. Innovative tools and methodologies empower educators to make data-driven decisions, implement evidence-based practices, and assess student performance in real time.

Through an in-depth literature review, this research aims to provide valuable insights into the practical application of Data Science and Data Analytics in educational decision-making, emphasizing its significance in shaping the future of primary school education. As technology continues to evolve, understanding the implications of these advancements becomes essential for educators, policymakers, and researchers to make informed decisions and create a more adaptive and effective educational environment for primary school students.

II. METHODOLOGY

The research method used is bibliometric analysis through three stages, the first is data collection, the second is data selection, and the third is data analysis using the help of VOSviewer. There are many reports related to bibliometrics. The description of the research stages is as follows:

A. Data Collection

Data on international publications were retrieved from the Google Scholar database from 2018-2023 using the Publish or Perish tool. The keywords used in the data collection are Data Analytics, Data Science, Decision Making, Evaluation, and Elementary School.

B. Data Selection

Data selection was carried out to obtain data that met the criteria, namely publications in the form of journal articles and based on the year of journal publication. Based on these criteria, 500 papers were obtained.

C. Data Analysis

Data analysis was conducted using VOSviewer to see three things, namely Network, Overlay, and Density Visualization. In addition, the data was collected using Ms. Excel to explain the research trend

III. Results and Discussion

The results of this research are described in three ways, namely 1) network visualization, 2) overlay visualization, and 3) density visualization.

A. Network Visualization

The results of network visualization analysis of data analytics, decision making, evaluation, and elementary schools using VOSviewer are described into 5 clusters (see Figure 1).

1) Cluster 1

Cluster 1 is shown in red and consists of 22 items, namely decision making, data, approach, research, predictive analysis, decision tree, section, artificial intelligence, industry, machine learning, algorithm, data science, analytics, data scientist, application, insight, predictive analytic, data analytic, analytic, big data analytic, future, order, and role. The data

topic has 53 relationships with other topics including decision-making, research, big data, data science, and machine learning. The data topic has a strength of 757 and an occurrence of 185.

2) Cluster 2

Cluster 2 is shown in green which consists of 19 items, namely analysis, decision, study, science, development, research, meta-analysis, evidence, outcome, effect, data collection, term, article, process, work, higher education, and student. The topic analysis has a relationship with 53 other topics including, decision, assessment, science, data analysis, and education. The topic analysis has a strength of 887 and occurrences of 233.

3) Cluster 3

Cluster 3 is shown in blue which consists of 6 items, namely evaluation, model, context, relationship, information, and ability. The evaluation topic has a relationship with 46 other topics including ability, role, student, higher education, and information. The topic of evaluation has strength 284 dan occurrences 69.

B. Overlay visualization

Overlay visualization is an analytical technique that enables an in-depth understanding of patterns and trends in research related to Data Analytics and Evaluation in primary schools. In the context of this research, focus was given to the period 2018-2023. The main objective of the overlay visualization analysis was to explore the content, patterns, and trends that emerged from documents and articles found on Google Scholar and published in international journals. The results of the overlay analysis using VOSviewer highlighted current research themes, which are highlighted in yellow in the visualization. This yellow pattern reflects the latest research topics such as data science, artificial intelligence, context, machine learning, industry, and role. (see Figure 2). However, observations also show that the number of publications in the fields of data analytics, evaluation, and elementary schooling is decreasing every year, reaching the highest peak in 2018 (143 publications) and decreasing drastically to only 10 publications by 2023 (see Figure 3).
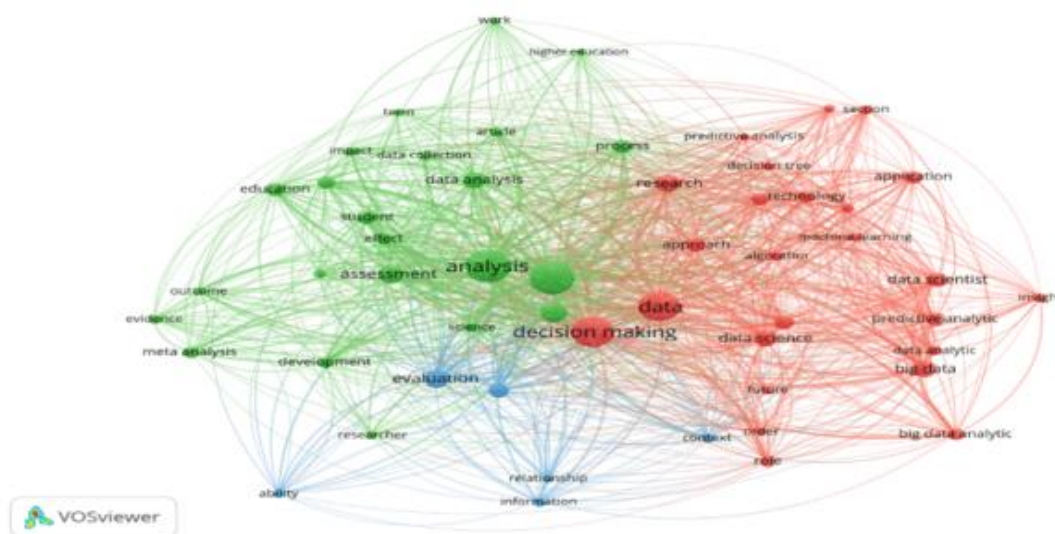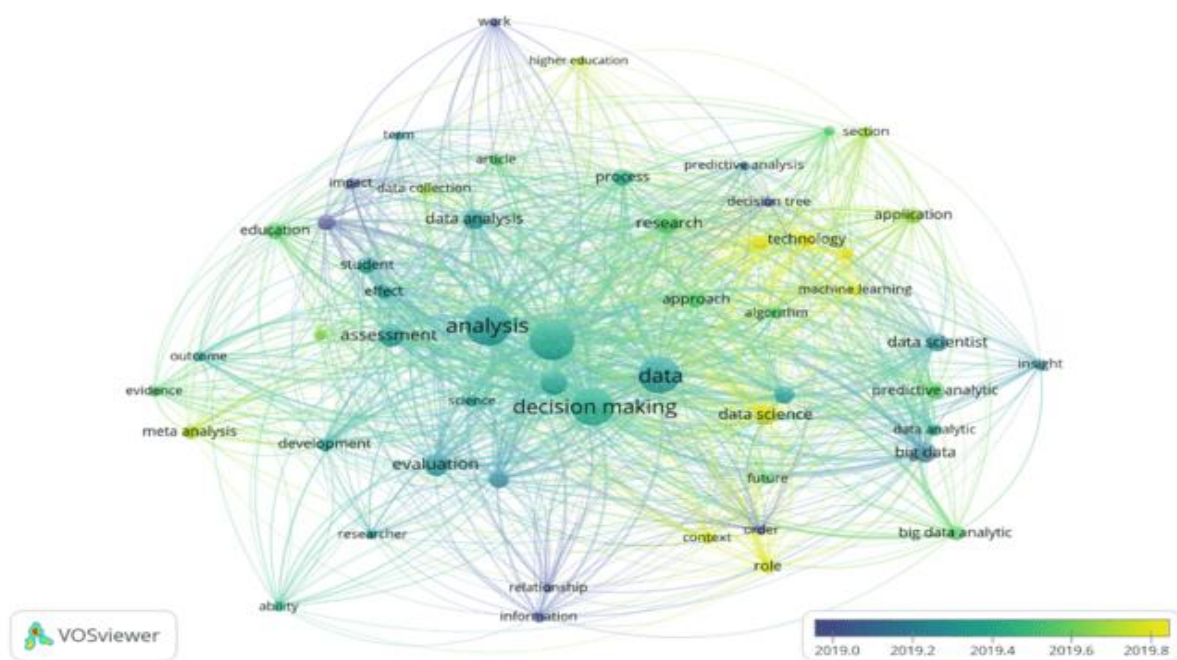

Figure 1. Network Visualization

Figure 2. Overlay Visualization

C. Density Visualization

This is an analysis of the density of the keywords data analytics, evaluation, and primary school. The bright yellow color that appears in the density visualization image shows the research topics that are often carried out. The bright yellow color is the research topic most often used by researchers, including analysis, decision, assessment, problem, decision-making, data scientist, approach, and machine learning.
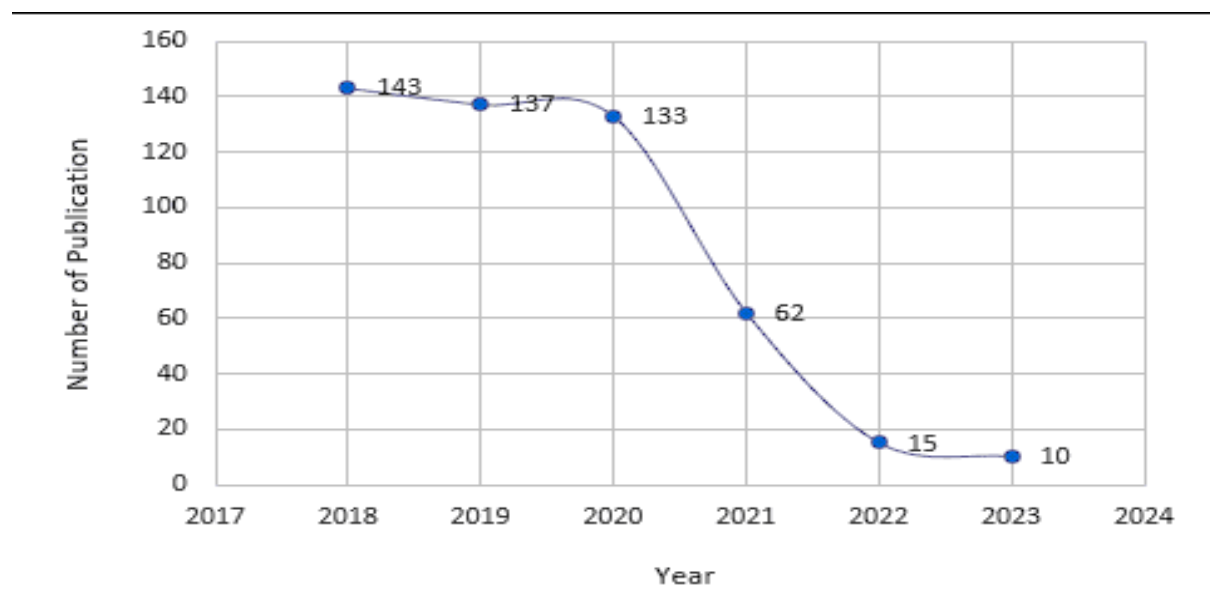

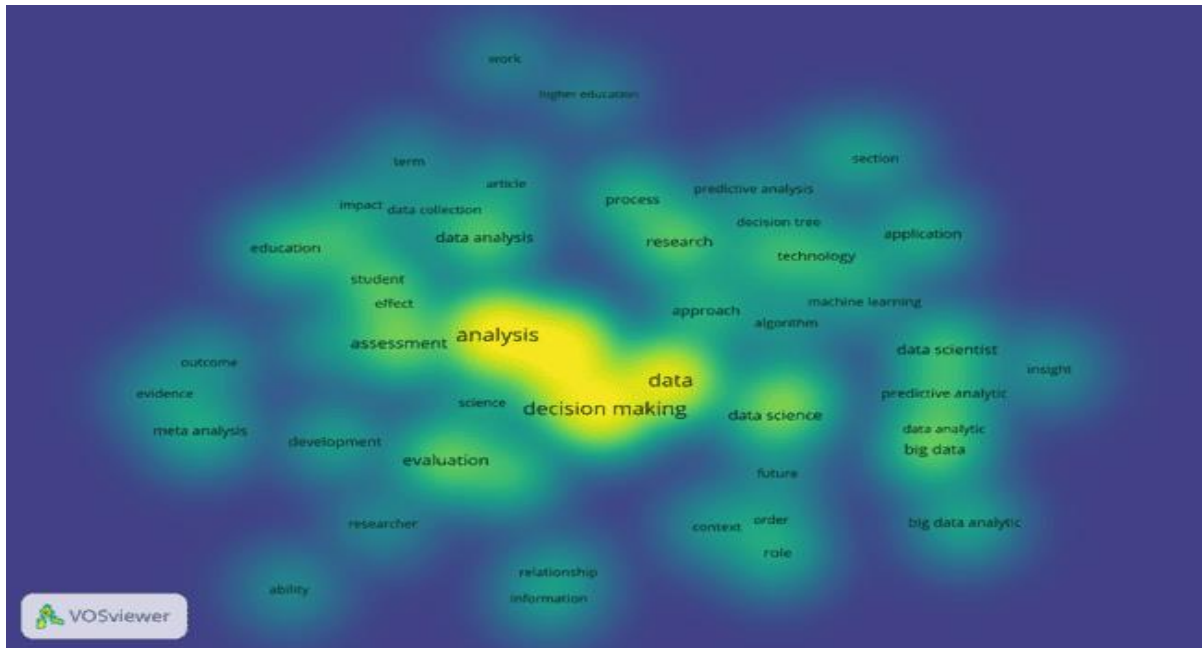Figure 3. Research Trends on Data Analytics, evaluation, elementary school

Figure 4. Density Visualization

IV. CONCLUSIONs

This research delves into recent advances in Data Science and Data Analytics and their impact on decision-making processes and evaluation practices in primary schools. Through bibliometric analysis, this study examined the international scientific literature related to Data Science, Data Analytics, Decision Making, Evaluation, and Primary Schools from 2018 to 2023. Data collected from the Google Scholar Database revealed contemporary trends in the utilization of information technology to improve primary education.

This study provides a better understanding of how the utilization of Data Science and Data Analytics can improve evaluation in primary schools, providing a basis for more effective and relevant decision-making in education. The findings enrich the scientific literature in this field and guide educational researchers and practitioners to integrate information technology in improving the quality of basic education.

V.   REFERENCES

1. Dash, S., Shakyawar, S. K., Sharma, M., & Kaushik, S. (2019, June 19). Big data in healthcare: management, analysis and future prospects. *Journal of Big Data*, *6*(1). https://doi.org/10.1186/s40537-019-0217-0
2. Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019, October 28). Systematic review of research on artificial intelligence applications in higher education – where are the educators? *International Journal of Educational Technology in Higher Education*, *16*(1). https://doi.org/10.1186/s41239-019-0171-0
3. -, M. E. A. (2023, November 24). Artificial Intelligence (AI) In Garment Design: Opportunities and Challenges In The Ready-made Garments (RMG) Sector of Bangladesh. *International Journal for Multidisciplinary Research*, *5*(6). https://doi.org/10.36948/ijfmr.2023.v05i06.7777

4. Duan, Y., Edwards, J. S., & Dwivedi, Y. K. (2019, October). Artificial intelligence for decision making in the era of Big Data – evolution, challenges, and research agenda. *International Journal of Information Management*, *48*, 63–71. https://doi.org/10.1016/j.ijinfomgt.2019.01.021

5. Shmueli, G., Sarstedt, M., Hair, J. F., Cheah, J. H., Ting, H., Vaithilingam, S., & Ringle, C. M. (2019, November 11). Predictive model assessment in PLS-SEM: guidelines for using PLSpredict. *European Journal of Marketing*, *53*(11), 2322–2347. https://doi.org/10.1108/ejm-02-2019-0189

6. Moser, A., & Korstjens, I. (2017, December 4). Series: Practical guidance to qualitative research. Part 3: Sampling, data collection and analysis. *European Journal of General Practice*, *24*(1), 9–18. https://doi.org/10.1080/13814788.2017.1375091

7. Snyder, H. (2019, November). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, *104*, 333–339. https://doi.org/10.1016/j.jbusres.2019.07.039

8. Oztemel, E., & Gursev, S. (2018, July 24). Literature review of Industry 4.0 and related technologies. *Journal of Intelligent Manufacturing*, *31*(1), 127–182. https://doi.org/10.1007/s10845-018-1433-8

9. Prediction models for prognosis of influenza: a systematic review and critical appraisal. (2021). *Signa Vitae*. https://doi.org/10.22514/sv.2021.148