Reading Between The Lines

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ABSTRACT

- This research aims to dive into learning analytics (LA) to give way in aiding decreasing levels of reading comprehension. LA a continuously evolving sector at the intersection of education, technology, and Data Science. Learning analytics offers a robust understanding of the learning process, to create personalized education, and early intervention. One area where learning analytics can make a significant impact is in reading comprehension, a fundamental skill for academic and personal success. This paper explores the application of learning analytics in predicting reading comprehension levels of students and aims to extend valuable insights to schools, educators and students. This research objective is to answer three (3) research questions; **Why does reading comprehension remain a persistent challenge? How can methodologies be applied to address this issue to suit individual students' reading comprehension? and How can the application of data-driven approaches strengthen strategies for improving reading comprehension?**

Overview

- The Philippines faces significant challenges in student literacy, as evidenced by its rankings in international assessments such as the Programme for International Student Assessment (PISA) conducted by the Organization for Economic Co-operation and Development (OECD).

- Despite a slight improvement in reading literacy scores from 2018 to 2022, the Philippines remains among the lowest-performing countries globally in reading comprehension, mathematics, and science.

- Notably, the performance of both top-performing students (TPS) and low-performing students (LPS) has shown minimal improvement, with some indicators even suggesting a decline in proficiency levels.[1]

RELATED WORKS

Poor Reading Comprehension

- Ongoing concern regarding reading abilities of Filipino students despite efforts to improve literacy rates.
- Recent studies reveal poor performance in reading comprehension, vocabulary development, and critical thinking skills among Filipino students.
- Factors contributing to reading deterioration include lack of mastery of reading elements, inclusion of learners-at-risk, lack of reading enthusiasm, teacher incompetence, shortage in reading materials and facility, parental involvement, and students' health (Librea et, al. 2023 [2]).
- Students with learning disabilities (LD) exhibit lower understanding compared to peers, with consistent poor performance in screen texts versus printed texts for ages 7 to 14.
- Limited studies on differences between printed and digital texts suggest potential benefits of technology in bridging LD in reading comprehension[3].

Current Strategies and Studies

- Previous studies on reading strategies have focused on sampled groups, thus not fully representing the total number of reading Filipinos.
- There is a misalignment between students' perceptions of the effectiveness of certain strategies and their actual effectiveness, indicating a lack of understanding of English as a secondary language among Filipino students but also shedding light on how students comprehend what they read (Capodieci et, al. 2020 [5]).
- Methods proven to increase reading comprehension among grade school students include predictive modeling, social network analysis, Social Networks Adapting Pedagogical Practice (SNAPP), iSTART, ITSS, and the Cloze procedure[5].

Learning Analytics

- Learning analytics encompasses the measurement, collection, analysis, and reporting of data about learners and their contexts to optimize learning environments [8].
- *An overview of learning analytics [9] discusses its applications and strategies for explaining concepts to non-technical stakeholders.*
- Integrating learner data with the curriculum empowers educators to assess students' understanding and identify strengths and weaknesses for targeted support.
- A systematic approach to learning analytics includes seven components: collection, storage, data cleaning, integration, analysis, representation and visualization, and action.
- Concerns surrounding learning analytics include its impact on the learning experience, privacy, ethics, and resistance from peers towards big data integration.

Feature Extraction

- **Word Frequency**: Researchers counted how often words appeared in text, then standardized the count by dividing it by the total number of words in the text, often measured per million or using the Zipf scale [11].
- **Sentence Length Measures**: Various metrics like word count, character count, and non-stop words were used to assess sentence complexity, with analysis techniques including linear correlation, distribution comparison, and detrended fluctuation [12].
- **Syntax Complexity**: Using the L2 Syntactic Complexity Analyzer (L2CA), researchers categorized sentence structure into groups like production unit length and subordination clauses, measuring indices such as mean clause length and clauses per sentence to gauge syntax complexity [13].

RESEARCH QUESTIONS

Data Protection Challenges

- (Liu, et, al. 2023)[10] Privacy is freedom from unauthorized intrusion and the ability to exclude oneself from data collection.

- **What are the identified privacy and data protection issues throughout the learning analytics process, from data collection to data reporting?**
  - Data Collected was in-excess of what was needed
  - Anonymity
- **How do stakeholders from various backgrounds view privacy and data protection issues in LA similarly and differently?**
  - Security of Data per stakeholder
- **How has previous research attempted to address the privacy and data protection issues identified in LA?**
  - Previous research looked on theoretical solutions with new algorithms, and legal areas in data protection

Ethics (Transparency)

- Transparency and bias considerations are crucial in research.
- It's important to ensure bias is accounted throughout experimentation.
- Misuse of collected data, leading to inconsistencies in its intended use.

BIG DATA

- Big data are shunned upon due to the work needed and understanding of the data
- Data Availability

Various output of LA

- The results of LA is based on the ability to translate the insights into meaningful actions, without effective intervention it diminishes the return invested in LA.

OBJECTIVES

Why does reading comprehension remain a persistent challenge?

- Explore factors contributing to persistent challenges in reading comprehension, including:
  - Lack of mastery of reading elements.
  - Inadequate reading enthusiasm among students.
  - Teachers' competency levels.
  - Shortages in reading materials and facilities.
  - Limited parental involvement.
  - Potential impacts of students' health.

Limitation

- Investigate educational disparities across regions and socioeconomic backgrounds.
- Review of standardized assessment measures across languages and cultural contexts.

How can methodologies be applied to address this issue to suit individual students' reading comprehension?

- Research on personalized learning approaches that can be tailored to individual students' needs.
- Explore adaptive learning technologies and interventions.
- Investigate the effectiveness of various teaching strategies and interventions.

Limitation

- Potential bias in algorithmic recommendations for personalized learning.
- Diverse needs and learning styles of each student.
- Resource Constraints, availability of technology
- Teaching proficiency

How can the application of data-driven approaches strengthen strategies for improving reading comprehension?

- The application of data-driven approaches offers a promising avenue for enhancing reading comprehension strategies.
- Through the analysis of various linguistic features such as word frequencies, sentence length, and syntax complexity, educators can gain valuable insights into students' reading abilities.
- Data-driven methodologies that allow for personalized instruction tailored to individual students' needs, potentially leading to improved reading comprehension outcomes.

Limitations

- May not capture Data-driven strategies that fully capture the complexity of reading comprehension
- The effectiveness of data-driven approaches relies on the quality and accuracy of the data collected, which may be subject to biases or inaccuracies.
- Source are limited, papers might not include the best actual strategies to aid in increasing reading comprehension that may introduce bias.

Ethics

- All research paper reviewed are in accordance with the proper agreement and data privacy act with the volunteers and their guardian/parents permission prior to the start of the study.

SIGNIFICANCE OF THE RESEARCH

- Reading comprehension does not stop adding value in education, it also boost social and economic development. An Improvement of reading comprehension level can open opportunities for an individual through understanding information and making informed decisions.

- This research will focus on understanding the cause of low reading comprehension of Filipino students, what are strategies being implemented and analytical approaches in feature extraction to develop an LA model.

- Through application of Learning analytics with data driven approach as jump start in solving reading comprehension challenges, the researcher aims to extend a helping hand to institutions, educators and students with potent tools and strategies to enhance literacy in the Philippines.

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