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Review research paper

A REVIEW OF BIG DATA ANALYTICS IN TEACHING ENGLISH AS A FOREIGN LANGUAGE

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Abstract. *The emergence of large corpora built from collections of human language, especially when integrated into artificial intelligence-driven systems, has created new opportunities for language teaching and learning, even though data collection and analysis in computer-assisted language learning is nothing new. Amazing linguistic talents are currently being generated by artificial neural networks. When working with large data sets, the education sector is progressively gaining popularity thanks to the use of data mining tools. Data from online educational platforms and the current ability to quickly gather, store, manage, and process data present an opportunity for educational institutions, students, teachers, and researchers. Numerous uses of big data exist in language learning, such as the real-time tracking and analysis of learner behavior, the creation and modification of teaching resources and techniques, and the enhancement of equational systems and rules. This position paper explores the application of big data in language learning and looks at several key ideas along with the most widely used instruments, approaches, and strategies in learning analytics and educational data mining. The methodological foundation of this study was the comprehensive literature review procedure. The value of data analytics in teaching English as a second language is assessed in three distinct scenarios. A tailored framework in the form of a process diagram has been suggested by the authors for English language learners whose mother tongue is Arabic.*

Key words*: EFL, TESOL, Big Data Analytics, Data mining, Learning Analytics*

1. INTRODUCTION

The advent of big data analytics has played a crucial role in the revolution of teaching and learning that has occurred in recent decades as a result of the integration of technology into education. Application of big data analytics has gained a lot of attention as academic institutions look for novel approaches to improve language instruction's efficacy. The goal of this research paper is to present a thorough analysis of big data analytics' application to TEFL (English as a Foreign Language) instruction. In the process, we look at how big data

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analytics has changed historically in education, talk about how relevant it is to language acquisition, and assess the advantages and disadvantages of its use.

Language acquisition is a dynamic and intricate process, especially when learning English as a foreign language. It calls for students to interact with a variety of linguistic components, cultural quirks, and instructional techniques. Standardized curricula and tests have long been the foundation of traditional language instruction, which occasionally fails to meet the specific needs and advancement of each individual student. On the other hand, the emergence of digital technology and the gathering of enormous volumes of educational data present a hitherto unseen chance to tailor and maximize language instruction.

2. BACKGROUND

Big data analytics, also known as learning analytics (LA) or educational data mining (EDM), has been increasingly popular in the educational field in recent years. In order to extract important insights on student behavior, performance, and engagement patterns, big data analytics entails the methodical collection, analysis, and interpretation of enormous datasets. These revelations can be used to improve educational results, customize learning experiences, and strengthen pedagogical methods (Baker 2019).

In addition, the dashboard produced by the data analysis process can help with decision-making and forecast outcomes for further improvement (Naidu et al. 2017). A more proactive and forward-thinking strategy will be enabled by the ability to track student advancement as well as the institution's success rate, status, successes, and areas of weakness in comparison to comparable benchmarked schools (Al Yousufi 2023).

The application of big data analytics to language learning is consistent with the more general learning goals of customization and flexibility. Conventional TEFL training may use a one-size-fits-all approach, presuming that students are all the same. Nonetheless, students in TEFL classes frequently have a variety of linguistic origins, learning preferences, and degrees of ability. By tailoring instruction to each student's needs, big data analytics can assist teachers in improving the learning process (Smith & Brown 2018). Big data analytics in TEFL offers a number of exciting opportunities for pedagogical advancement.

First of all, it makes it possible to monitor student performance and progress in real time. By examining how students engage with digital materials, teachers can learn more about the areas in which their pupils thrive and struggle. Targeted interventions can be informed by data-driven insights, providing struggling learners with timely support (Anderson 2017).

Second, big data analytics can help with the creation of intelligent tutoring programs and platforms for adaptive learning. These systems adapt the level of difficulty and content of exercises based on individual performance and preferences, using algorithms to give learners tailored learning pathways. This flexibility maximizes engagement and retention by guaranteeing that students receive content that is neither very difficult nor too simple (Johnson 2021).

Thirdly, big data analytics can help with curriculum evaluation and improvement. Through the examination of student accomplishment trends and the efficacy of various teaching resources, educational establishments can make well-informed choices on curriculum development and resource distribution. The efficacy and efficiency of TEFL programs are improved by this data-driven strategy (UNESCO 2020).

3. Literature Review

Data analytics has become a useful tool for educators and institutions to improve the teaching and learning of English as a second or foreign language. This includes educational data mining (EDM) and learning analytics (LA). This review of the literature investigates the use of data analytics in TESOL, looking at its advantages, disadvantages, uses, and field-wide effects.

3.1. Personalized Learning

Creating customized learning paths for students is one of the main uses of data analytics in TESOL. Teachers can customize education to match the needs of each student by evaluating each student's language proficiency level, learning style, and progress (González-Brenes 2015). To ensure that students receive individualized help, adaptive learning platforms, for instance, use data analytics to modify the level of exercises and content based on student success (Baker 2019).

3.2. Assessment and Feedback

Using data analytics, teachers may evaluate student performance at a more detailed level. Language proficiency in speaking, writing, listening, and reading can all be assessed by automated assessment systems, which can also indicate areas in need of improvement and provide thorough feedback (Romero & Ventura 2010). Students' understanding of their strengths and weaknesses is aided by this data-driven feedback loop, which promotes self-directed learning.

3.3. Curriculum Improvement

Data analytics can be used by institutions to assess how well teaching materials and language programs work. Educators can make data-driven decisions on curriculum design and resource allocation by examining student outcomes and engagement patterns (UNESCO 2020). This guarantees that TESOL courses stay current and adaptable to changing demands in education.

4. Proposed Process

The relationships between the Student, Learning Platform, English Course, Analytics Engine, and Language Data are depicted in this process diagram (Fig. 1). The student uses the Learning Platform to access the English course and peruses the course materials. The English Course provides them with feedback on the exercises they submit. The learning data is then sent to the Analytics Engine by the Learning Platform, which the Student uses to view learning analytics. After retrieving language data from the Language Data source, the Analytics Engine examines the learning data. Lastly, the student receives the analytics findings from the learning platform.

Big data analytics is applied in Teaching English as a Foreign Language (TEFL) in a dynamic ecosystem that is largely dependent on the interactions between the student, learning platform, English course, analytics engine, and language data.

4.1 Student: The centerpiece of this ecosystem and the main gainer of the whole thing is the student. The English course material and the learning platform are just two of the elements the student engages with. Completing tasks, passing tests, taking part in debates, and interacting with multimedia content are examples of these interactions. Through the data points that are produced by each of these encounters, one can learn more about the student's learning path, preferences, skills, and limitations.

4.2. Learning Platform: Students access course materials, participate in activities, and monitor their progress in this virtual environment. By providing a single hub for learning, it helps students and educators communicate with one another. The platform keeps track of the activities and interactions of the students, including how long they spend on assignments, what resources they use, and how often they participate.

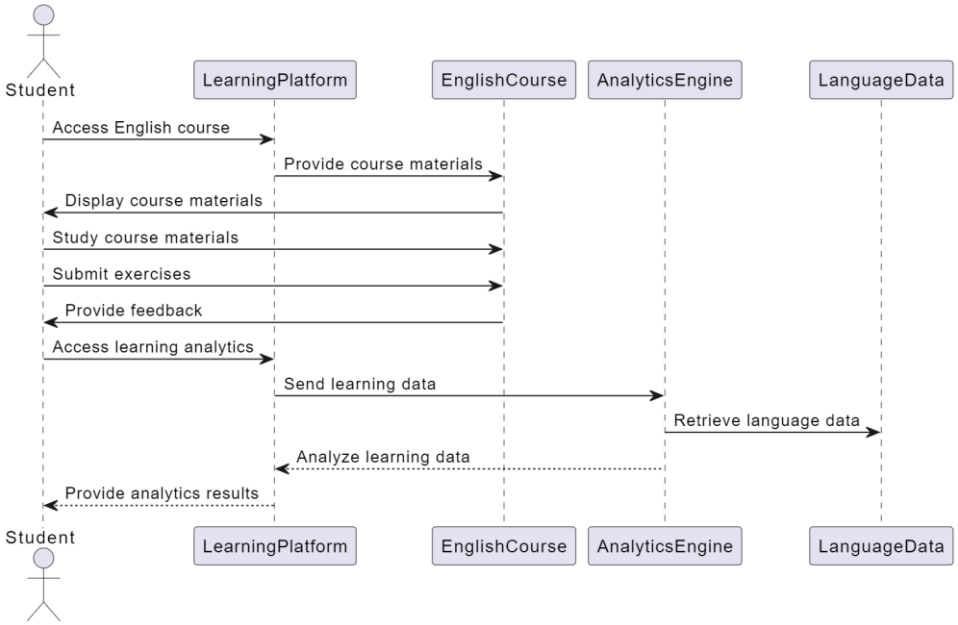

Fig. 1 UML diagram showing the proposed flow of the process

4.3 English Course: The lessons, activities, evaluations, and teaching materials included in the English course are meant to help students learn the language. These courses may be offered online or in conventional classroom settings. Text, audio, video, and interactive features are all possible in the material. Students create data that reflects their performance, comprehension levels, and responses as they interact with the course material.

4.4. Analytics Engine: The fundamental element in charge of handling and evaluating the data produced by students' interactions with the English course and learning platform is the analytics engine. To extract significant insights, it makes use of statistical approaches, machine learning algorithms, and data mining techniques. Personalized learning pathways, learning outcome prediction, and behavior patterns in students are a few examples of these discoveries. The analytics engine converts unprocessed data into knowledge that educational institutions and educators may use.

4.5. Language Data: A key component of language instruction and analysis is language data, which includes language corpora, linguistic databases, and reference resources. This information can be used to monitor vocabulary growth, analyze language usage trends, and gauge language proficiency. Furthermore, student-generated data and language data can be combined to offer a holistic picture of language learning progress.

When these encounters occur together, they form a feedback loop that keeps improving and customizing the learning process. By processing the data produced by student interactions, the Analytics Engine offers institutions and instructors insightful information. Based on the recommendations generated by analytics, educators can then change the course material, their teaching methods, and the individualized support they provide to each student. This environment gives teachers the ability to make data-driven decisions that increase TEFL program efficacy and, ultimately, student language learning outcomes. In the sector of education, where data-driven insights are reshaping the future of teaching and learning, it also highlights the revolutionary potential of big data analytics.

5. Benefits of Data Analytics in TESOL

5.1. Better results in learning

Using data analytics in TESOL has the potential to greatly improve student learning outcomes. Improved language competence and acquisition can result from tailored learning paths and prompt interventions based on data-driven insights (Smith & Brown 2018).

5.2. Resource Optimization and Efficiency

Data analytics finds areas where teaching and learning can be improved, which helps organizations use resources as efficiently as possible. Cost savings and more effective use of instructional resources are possible as a result (González-Brenes 2015).

5.3. Data-Driven Decision-Making

Based on data analytics, educational institutions and teachers can make well-informed judgments on curriculum development, instructional tactics, and resource allocation. The quality of TESOL programs is improved by this evidence-based strategy (Romero & Ventura 2010).

6. Challenges in implementing data analytics in TESOL

6.1. Data Privacy and Security

Data about students is collected and stored, which raises privacy issues. Establishing strong data security protocols and ensuring compliance with data protection laws are requirements for institutions (Baker 2019).

6.2. Ethical Considerations

One crucial factor to take into account is the ethical usage of data, particularly when working with minors. In order to resolve ethical concerns, transparency and informed consent are crucial (UNESCO 2020).

6.3. Technology Integration

Technology integration with conventional teaching techniques is necessary for the implementation of data analytics in TESOL. To use data analytics tools effectively, educators require assistance and training (Smith & Brown 2018).

7. Conclusion

The area of TESOL has a lot to gain from the incorporation of data analytics. But it also necessitates giving ethical and privacy issues considerable thought. In order to guarantee equitable access to data-driven learning resources, future TESOL research should address the digital divide, look into the long-term effects of data-driven instruction, and investigate the development of more advanced analytics tools (González-Brenes 2015).

The use of big data analytics in TEFL is emerging as a crucial frontier as technology and education grow more mutually dependent. The revolutionary potential of big data analytics in streamlining language training, customizing student experiences, and enhancing curriculum has been emphasized in this introduction. It has, though, also shown how important it is to give ethical and privacy issues serious thought.

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