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USING DATA ANALYSIS TO IMPROVE THE TEACHING OF RESEARCH WRITING

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Abstract
This paper looks at four types of data analysis—Descriptive, Diagnostic, Predictive, and Prescriptive—and how they can be used to teach research writing. These methods help teachers understand student performance, identify challenges, predict future outcomes, and suggest ways to improve writing skills. By using these methods, teachers can better support students in becoming better writers.

Keywords: Data analysis, descriptive analysis, diagnostic analysis, predictive analysis, prescriptive analysis.

Introduction

ИСПОЛЬЗОВАНИЕ АНАЛИЗА ДАННЫХ ДЛЯ УЛУЧШЕНИЯ ПРЕПОДАВАНИЯ НАПИСАНИЯ ИССЛЕДОВАТЕЛЬСКОМУ ПИСЬМУ

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Аннотация:
В данной статье рассматриваются четыре типа анализа данных — описательный, диагностический, прогностический и предписывающий — и их применение в обучении написанию исследовательских работ. Эти методы помогают преподавателям понимать успеваемость студентов, выявлять трудности, прогнозировать будущие результаты и предлагать способы совершенствования навыков академического письма. Используя данные методы, преподаватели могут более эффективно поддерживать студентов в процессе развития их письменной исследовательской компетенции.

Ключевые слова: анализ данных, описательный анализ, диагностический анализ, прогностический анализ, предписывающий анализ.

Introduction

In contemporary education, data-informed decision-making has become an important component of effective teaching and assessment. The systematic use of data allows educators to evaluate learners' academic progress, identify areas of difficulty, and design more targeted instructional strategies. This approach is particularly relevant in the teaching of research

writing, where students are expected not only to produce coherent academic texts but also to formulate research problems, develop thesis statements, organize arguments, integrate sources, and follow academic conventions.

Research writing is a complex skill that requires continuous feedback, long-term assessment, and the development of transferable academic competencies. Previous studies emphasize the importance of aligning assessment with long-term learning outcomes, providing effective feedback, and supporting students through structured pedagogical interventions. In this context, data analysis can serve as a practical and methodological tool for improving the quality of teaching and learning in research writing courses.

Four major types of data analysis are especially useful for this purpose: descriptive, diagnostic, predictive, and prescriptive analysis. Descriptive analysis helps teachers understand students' current level of performance and writing progress. Diagnostic analysis makes it possible to identify the causes of students' difficulties, such as weak argumentation, unclear thesis statements, or improper use of sources. Predictive analysis can be used to anticipate future learning outcomes and determine which students may need additional support. Prescriptive analysis, in turn, offers recommendations for instructional improvement and individualized learning strategies.

Therefore, the purpose of this paper is to examine how descriptive, diagnostic, predictive, and prescriptive data analysis can be applied to improve the teaching of research writing. The paper argues that the integration of data analysis into writing instruction enables teachers to make more objective pedagogical decisions, provide more effective feedback, and support students in developing stronger academic writing skills. This paper explains how these methods can be used in teaching research writing.

Materials and Methods

The present study employed a data-informed methodological framework to examine how different types of data analysis can be used to improve the teaching of research writing. The research data were collected from undergraduate students enrolled in a research writing course. The dataset included students' written assignments, such as research papers, annotated bibliographies, and peer-reviewed drafts. These materials were selected because they reflect essential components of research writing competence, including thesis formulation, argument development, source integration, citation accuracy, and adherence to academic writing conventions. Such an approach is consistent with the idea that assessment should be aligned with long-term learning outcomes rather than limited to short-term performance measurement [1].

Four types of data analysis were applied in this study: descriptive, diagnostic, predictive, and prescriptive analysis. Descriptive analysis was used to identify general patterns in students' academic writing performance. In particular, measurable indicators such as word count, number of academic sources used, timeliness of assignment submission, and completion rates were recorded. These indicators provided an overview of class-level performance and helped the instructor evaluate the extent to which students met the basic requirements of research writing tasks.

Diagnostic analysis was conducted to determine the main causes of students' writing difficulties. Particular attention was given to recurring problems such as weak thesis statements, insufficient argumentation, incorrect citation practices, limited source integration, and poor textual coherence. This stage of analysis made it possible to move beyond general performance indicators and identify specific areas where students required additional support. In this regard, effective feedback plays a central role, as it helps students understand their weaknesses and revise their writing more purposefully [2].

Predictive analysis was then used to estimate students' potential performance in the final research paper. Earlier assignments, including drafts, annotated bibliographies, and citation-based tasks, served as indicators for predicting future writing outcomes. This approach allowed the instructor to identify students who were at risk of underperforming and to provide timely pedagogical intervention before the final submission. The use of predictive models in academic contexts has been shown to be useful for anticipating student outcomes and improving instructional decision-making [3].

Prescriptive analysis was applied to formulate targeted recommendations for improving students' research writing skills. Based on the results of descriptive, diagnostic, and predictive analysis, students were advised to participate in additional workshops on thesis development, academic argumentation, citation styles, and source-based writing. This stage transformed data analysis from a purely evaluative procedure into a practical tool for instructional improvement and individualized academic support. A prescriptive approach is particularly valuable in research writing instruction because it allows teachers to offer concrete strategies for overcoming students' academic writing difficulties [4].

The methodological framework of this study demonstrates that data analysis can support not only assessment but also the development of transferable academic skills. By systematically analyzing students' writing performance, teachers can make more objective pedagogical decisions, provide more effective feedback, and help students develop competencies required for academic and professional communication in the twenty-first century [5].

Results

The findings of the study were classified according to the four types of data analysis applied in the research: descriptive, diagnostic, predictive, and prescriptive analysis. This classification made it possible to examine students' research writing performance from several perspectives, including general learning outcomes, causes of writing difficulties, prediction of final performance, and targeted instructional support.

The descriptive analysis revealed several important patterns in students' research writing behavior. First, 85% of students submitted their assignments on time, which indicates a generally positive level of task completion and academic responsibility. Second, the average length of students' research papers was approximately 3,200 words, suggesting that most students were able to meet the expected scope of the assignment. Third, students used an average of five to seven scholarly sources per paper. Although this result demonstrates a basic ability to work with academic literature, it also shows that some students relied on a limited number of sources, which may have affected the depth and credibility of their arguments.

The diagnostic analysis helped identify the most common problems in students' research writing. Approximately 40% of students produced thesis statements that were either too broad, unclear, or insufficiently focused. This finding suggests that many students experienced difficulty in formulating a precise research position. In addition, around 30% of students demonstrated problems with citation formatting, particularly in the use of APA and MLA styles. Another recurring issue was weak argumentation: many students failed to support their claims with sufficient evidence or to establish a clear logical connection between their thesis, arguments, and sources. These findings indicate that students required more systematic support in thesis development, citation practice, and evidence-based academic argumentation.

The predictive analysis was conducted on the basis of students' earlier assignments, including drafts, annotated bibliographies, and preliminary research tasks. The results showed that students who performed well in earlier drafts had an 85% probability of achieving strong results in the final research paper. By contrast, students with weaker drafts had a 60% probability of scoring below the class average in the final paper. These results confirm that early writing performance can serve as an important indicator of final academic outcomes. Therefore, predictive analysis allowed the instructor to identify students who were at risk of underperforming and to provide additional support before the final submission.

The prescriptive analysis was used to develop targeted recommendations for improving students' research writing skills. Students with weak thesis statements were encouraged to attend thesis-writing workshops focused on narrowing research topics, formulating clear research claims, and developing coherent academic arguments. Students who struggled with citation formats were provided with APA and MLA style guides and were advised to participate in online citation workshops. In addition, students who demonstrated weak argumentation were invited to peer review sessions, where they could receive feedback on their drafts and learn how to strengthen their claims through evidence-based reasoning.

Discussion

The results show that using these types of data analysis can be very helpful in teaching research writing. *Descriptive analysis* gave us a clear picture of how the class was performing overall, allowing us to see trends, like how many students were submitting assignments on time and how many sources they were using. It helped us dig deeper into the reasons behind students' struggles, such as issues with citations or unclear thesis statements. This allowed us to identify specific areas that needed more attention.

Predictive analysis gave us a way to forecast how well students would do on their final papers based on their past performance. This early prediction helped us identify students who might need extra support, giving us a chance to intervene before the final paper was due. Finally, *prescriptive analysis* provided actionable recommendations. Based on the analysis, we were able to suggest ways for students to improve specific aspects of their writing, like attending workshops or working on peer review.

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Conclusion

The findings of this study demonstrate that the integration of descriptive, diagnostic, predictive, and prescriptive data analysis can significantly enhance the teaching of research writing. Each type of analysis contributed to a different stage of the instructional process. Descriptive analysis provided a general overview of students' writing performance by identifying patterns related to submission timeliness, paper length, and the use of scholarly sources. Diagnostic analysis revealed the main areas of difficulty, including weak thesis statements, citation problems, insufficient argument development, and limited use of evidence. Predictive analysis made it possible to identify students who were likely to experience difficulties in the final research paper, while prescriptive analysis transformed these findings into targeted pedagogical interventions.

The study confirms that data analysis should not be viewed only as a technical tool for measuring student performance. Rather, it can function as a systematic pedagogical mechanism for improving feedback, academic support, and instructional planning. By using data-based evidence, teachers can make more objective decisions, identify students' individual learning needs, and provide appropriate support before writing problems become persistent. In this respect, data analysis contributes to a more personalized and responsive model of research writing instruction.

Overall, the application of these four analytical approaches supports the development of stronger academic writing skills among undergraduate students. It helps teachers move from general assessment to evidence-based intervention and from reactive correction to proactive academic support. Therefore, the use of descriptive, diagnostic, predictive, and prescriptive analysis can be considered an effective strategy for improving students' research writing competence and promoting their long-term academic development.

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