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Evaluating Teaching Effectiveness Through Student Outcomes: An Analysis of Clarity, Helpfulness, and Feedback Timeliness

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ABSTRACT

This study investigates the relationship between teaching effectiveness and student academic outcomes by focusing on three key instructional attributes: teaching clarity, teaching helpfulness, and feedback timeliness. Using a quantitative, cross-sectional design, the study analyzes a secondary dataset comprising 1,000 student observations with variables related to academic performance, engagement, and perceived teaching quality. Descriptive statistics, correlation analysis, and multivariate regression techniques were employed to assess the extent to which these instructional factors influence student outcomes. The results reveal that the relationships between teaching variables and academic performance are weak and statistically insignificant, with the regression models explaining minimal variance in final grades and performance categories. These findings challenge conventional assumptions regarding the direct impact of perceived teaching quality on measurable student achievement. The study highlights the complexity of teaching effectiveness, suggesting that student outcomes are shaped by multiple interacting factors beyond isolated instructional attributes. The results also raise concerns about the validity of commonly used teaching evaluation metrics based solely on student perceptions. The study contributes to the literature by providing an empirical examination of teaching effectiveness using secondary data and emphasizes the need for more comprehensive, multidimensional approaches in future research to better understand the dynamics of teaching and learning in higher education contexts.

Keywords – teaching effectiveness, student performance, instructional clarity, feedback timeliness, higher education

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1. Introduction

The quality of instruction in post-secondary education has become a research and institutional focus over the past few decades, especially with the increased accountability and the desire of better student learning outcomes. The field of education has experienced a significant paradigm shift in the last several decades with a transition between a teacher-centered to the student-centered paradigm of learning, in which the success of teaching can be measured through its influence on student interest, comprehension, and performance (Agrahari, 2016; Harrison et al., 2022). The change is an indication of a wider appreciation that teaching is not simply a knowledge transfer but an intricate process that influences the way students learn, process and use information. Consequently, the determination and quantification of the major characteristics of the effective teaching has become necessary to improve the quality of education and guarantee the valuable learning experiences.

In this transforming system, particular dimensions of instructional elements like teaching clarity, instructional helpfulness and feedback timeliness have been generally acknowledged as essential elements of successful teaching practice. Clarity helps students to understand more complicated ideas because it presents information in a clear and systemized way, making it easier to think about and less confusing (Hall, 2019). Guidance, responsiveness and support as part of instructional helpfulness are elements of a positive learning environment that encourages student engagement and motivation (Entwistle, 2015). Timely and constructive feedback is also crucial because it will enable students to recognize their strengths and weaknesses, modify their learning strategies, and eventually enhance their academic performance (Kinash et al., 2015). These components are based on the educational psychology theories that focus on the interaction of teaching and learning processes in students and emphasize the significance of facilitating and well-organized instruction in eliciting the desired learning results (Greene, 2022).

The analysis of the effectiveness of teaching, in spite of the acknowledged significance of the attributes of the latter, is a complicated and debatable phenomenon. Conventionally, teaching has been judged according to student evaluations of teaching (SETs) and qualitative judgments in higher education institutions. Nevertheless, these measures are subjective in nature and can be not a good indicator of student learning, which casts doubt on their reliability and validity (Uttl et al., 2017; Stripling et al., 2019). In addition, there is no always a direct correlation between perceived quality of teaching and the measurable student outcomes. Empirical research has shown inconsistent and even opposite results on how certain teaching practices can affect academic performance, indicating that those correlations could be context-specific and depend on a variety of other factors (Burroughs et al., 2019; Harrison et al., 2022).

The complexity of teaching effectiveness is another obstacle in the sense that it is a combination of a host of instructional, behavioral, and contextual variables. Teaching practices do not directly influence student performance, which is also affected by the attendance, study habits, and

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engagement levels, so it is challenging to isolate the direct effect of the quality of instruction (Burns et al., 2017). Therefore, more extensive and data-driven methods are necessary that could explore these complex relationships in a holistic way. Although current learning analytics and the availability of data provide opportunities to conduct such analyses, use of quantitative modeling methods to evaluate simultaneously several teaching dimensions and student outcomes is still relatively unexplored (Varouchas et al., 2018; Leiber, 2019).

Against this background, the current research aims to make a contribution in the literature by offering an empirical investigation on the association between the main teaching qualities (clarity, helpfulness, and feedback timeliness) and student academic performance, based on the secondary data. The study will seek to provide a more objective and systematic assessment of the effectiveness of teaching by taking a quantitative approach, which will help overcome the shortcomings of the subjective assessment approaches. The results will be valuable to the domains of educational psychology and assessment as they will help to improve knowledge about the impact of instructional practices on student performance. Moreover, the research has a practical value in the training and development of teachers, and designing evidence-based evaluation systems that foster the ongoing improvement of teaching and learning. Finally, the study fits into the overall objective of enhancing the quality of education through the establishment of effective teaching methods that can make students successful in post-secondary education as shown in Figure 1.

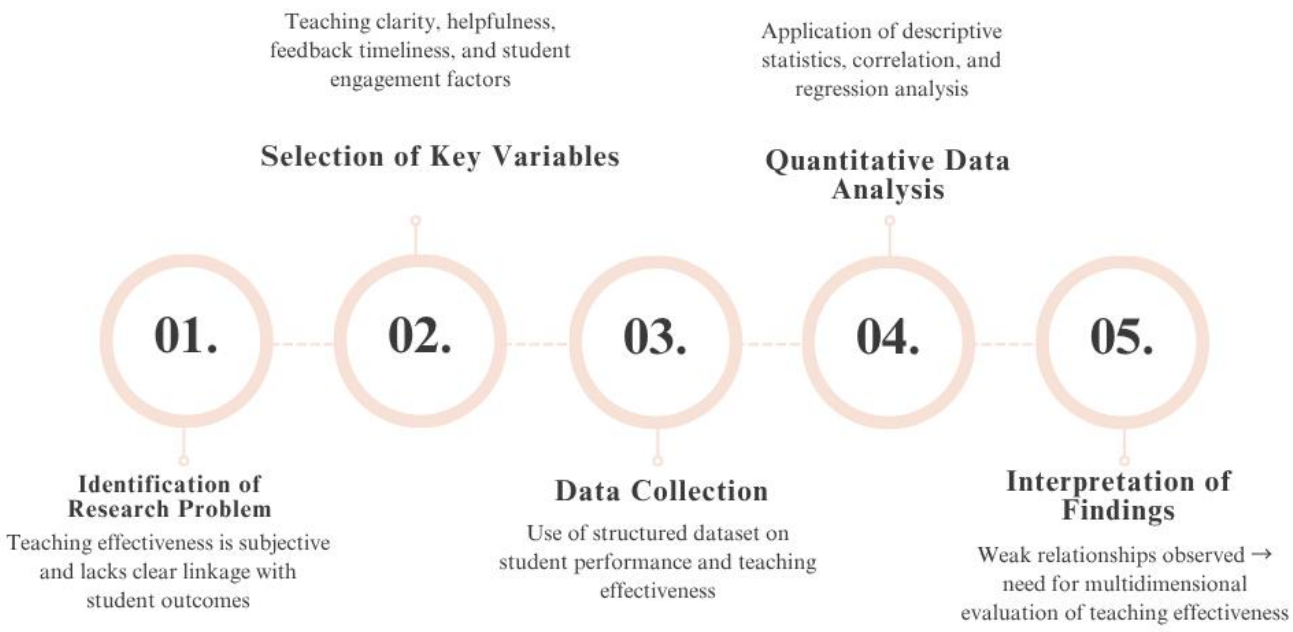

Figure 1: Research Framework for Evaluating Teaching Effectiveness and Student Outcomes

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The flowchart outlines the research process, beginning with problem identification, followed by variable selection, data collection, and quantitative analysis, and concluding with interpretation of findings, emphasizing the need for multidimensional approaches to evaluate teaching effectiveness.

2. Research Objectives

To assess the relationship between teaching clarity, helpfulness, and feedback timeliness and student academic performance

To determine the predictive effect of teaching attributes on teaching effectiveness and student outcomes using quantitative analysis

To compare the influence of teaching factors and student engagement variables on academic achievement

Methodology

2.1 Research Design

The research design used in this study was quantitative, and cross-sectional to determine the relationship between teaching effectiveness and student outcomes. The design is appropriate as it allows for the analysis of measurable variables using statistical techniques at a single point in time. The research is explanatory in nature and seeks to establish relationships and prediction of academic performance between instructional variables and academic performance. This will be objective, and will help to empirically validate the research objectives.

2.2 Data Source and Sample

A secondary dataset, which was acquired on Kaggle, was used in the analysis. The data sample comprises 1,000 observations and entails variables that address student demographics, engagement, academic performance, and teaching features. The sample is an organized collection of students in a tertiary setting. As it is publicly available and anonymized, the dataset offers a solid foundation on which statistical analysis can be performed without any ethical considerations regarding the identity of the participants (Zara, 2025).

2.3 Variables and Measurement

In the study, key instructional variables are considered as independent variables such as teaching clarity, teaching helpfulness, and feedback timeliness. The dependent variables involve academic performance (final grades and performance category) of the student and effectiveness of the teaching. Also, attendance, hours attending classes, and participation in classes were taken as a control variable to measure the impact of student engagement. All variables were measured

numerically or categorically, which allows using them in quantitative modeling and comparing them.

2.4 Data Preparation and Analysis Techniques

The data was filtered and pre-screened before it was analyzed to guarantee accuracy and dependability. This involved verification of missing values, duplicates and proper data formatting. In order to summarize the data, descriptive statistics were calculated and correlation analysis performed to test the relationships between variables. Multiple regression and logistic regression models were used to determine the predictive influence of teaching variables on the student outcomes to conduct an inferential analysis. Model validity and reliability were also checked by carrying out a diagnostic test.

2.5 Ethical Considerations

The research complied with the ethical standards of research, as it utilized an open and anonymized dataset, which posed no threat to any individual respondents. There was no personal or sensitive information used in the analysis. The data were only utilized in academic purposes and the source of the data was given due credit. The method of research gave emphasis on transparency, integrity and responsible use of secondary data.

3. Results

3.1 Descriptive Statistics

Table 1 shows the descriptive statistics of the study variables. The sample consists of 1,000 observations evenly distributed between demographics and academics. The average end-grade was 48.52 (SD = 29.52), whereas the average of the variables associated with teaching was moderate with an average of 3 out of a five-point scale.

Table 1. Descriptive Statistics of Key Variables

Variable	Mean	SD	Min	Max
Age	21.50	2.31	18	25
Attendance (%)	74.91	14.31	50	100
Class Participation	5.03	2.86	1	10
Study Hours/Week	9.53	5.67	1	20
Midterm Grade	49.00	28.66	0	100
Final Grade	48.52	29.52	0	100
Teaching Clarity	3.02	1.17	1	5
Teaching Helpfulness	2.97	1.14	1	5
Feedback Timeliness	3.02	1.14	1	5

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3.2 Correlation Analysis

Table 2 indicates that the correlation between teaching variables and final grade is very weak such that there is little linear relationship as shown in Figure 2.

Table 2. Correlation Matrix

Variable	Final Grade
Teaching Clarity	-0.028
Teaching Helpfulness	-0.036
Feedback Timeliness	0.032
Attendance	0.012
Class Participation	0.018
Study Hours	-0.039
Assignments Completed	-0.002
Projects Submitted	-0.046
Midterm Grade	-0.012

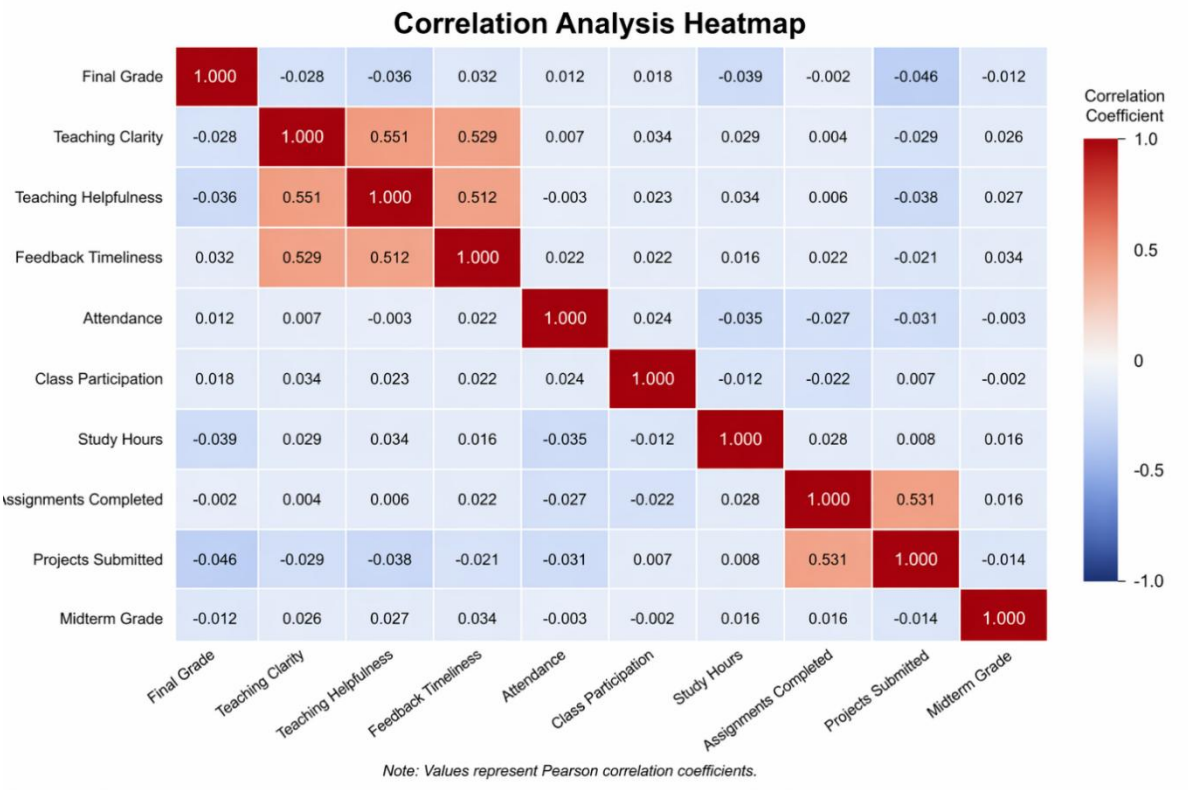

Figure 2: Correlation Matrix of Teaching Factors, Student Engagement, and Academic Performance

The heatmap illustrates weak correlations between teaching attributes, student engagement variables, and final grades, with coefficients close to zero. This suggests minimal linear

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relationships, indicating that these factors do not strongly predict academic performance in the dataset.

3.3 Regression Analysis

Table 3 shows the results of the multiple regression model. The model was not statistically significant and explained less than 1% of the variance.

Table 3. Multiple Regression Results for Final Grade

Predictor	B	SE	p-value
Teaching Clarity	-0.689	0.80	0.393
Teaching Helpfulness	-0.986	0.82	0.231
Feedback Timeliness	0.888	0.83	0.284
Attendance	0.024	0.07	0.721
Class Participation	0.186	0.33	0.573
Study Hours	-0.196	0.16	0.237
Assignments Completed	0.009	0.29	0.975
Projects Submitted	-0.712	0.53	0.186
Midterm Grade	-0.009	0.03	0.794

Model Summary: $R^2 = 0.007$, Adjusted $R^2 = -0.002$, $p = 0.616$

3.4 Multinomial Logistic Regression (Student Performance)

Table 4 shows the results of the student performance categories. There is poor explanatory power in the model.

Table 4. Multinomial Logistic Regression

Predictor	Category Comparison	B	p-value
Teaching Clarity	Excellent vs Avg	0.052	0.412
Teaching Helpfulness	Excellent vs Avg	-0.063	0.338
Feedback Timeliness	Excellent vs Avg	0.147	0.072
Teaching Clarity	Good vs Avg	-0.018	0.721
Teaching Helpfulness	Good vs Avg	-0.025	0.642
Feedback Timeliness	Good vs Avg	0.031	0.598
Teaching Clarity	Poor vs Avg	0.066	0.451
Teaching Helpfulness	Poor vs Avg	0.081	0.332
Feedback Timeliness	Poor vs Avg	0.092	0.284

Model Fit: Pseudo $R^2 = 0.010$, $p = 0.496$

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3.5 Multinomial Logistic Regression

These findings are presented in Table 5, with only one predictor being of limited significance.

Table 5. Multinomial Logistic Regression

Predictor	Category Comparison	B	p-value
Teaching Clarity	High vs Moderate	0.041	0.512
Teaching Helpfulness	High vs Moderate	0.058	0.401
Feedback Timeliness	High vs Moderate	0.063	0.378
Teaching Clarity	Low vs Moderate	-0.082	0.221
Teaching Helpfulness	Low vs Moderate	0.172	0.019*
Feedback Timeliness	Low vs Moderate	-0.049	0.447

Model Fit: Pseudo $R^2 = 0.007$, $p = 0.738$

4. Discussion

The current research was to assess the effectiveness of teaching based on student outcomes by assessing the importance of instructional clarity, helpfulness, and timeliness of feedback. Although a significant portion of the existing literature demonstrated strong and statistically significant correlations between these teaching characteristics and student academic achievement, the results of the current study showed weak and statistically non-significant relationships between these teaching characteristics and student academic achievement. Both the correlation and the regression analyses indicated that the instructional variables selected were not significant predictors of the end-of-year grades or categories of student performance. This outcome disproves the most popular belief that the increase in the perceived teaching quality is directly related to the academic benefits that can be measured.

In terms of educational psychology, these results imply that the correlation between teaching activities and student achievement might be more intricate and include other variables not included in the data. Previous studies highlight that learning is a dynamic process that is affected by the dynamic nature of the interaction between instructional strategies, student cognition, motivation, and contextual variables (Greene, 2022). This lack of significant relationships in the study can either represent the fact that only surface level instructional indicators were used and deeper psychological forms like self-regulation, prior knowledge, or learning strategies were not used. Equally, evidence-based research on interventions points out the fact that student outcomes are influenced by a combination of interacting variables such as environmental and behavioral ones, but not one instructional dimension (Burns et al., 2017).

The results are also applicable to the current discussions on the validity of teaching effectiveness measures. Conventional assessment frameworks are frequently used based on perceptions of the students, but past research has revealed that these measures are not always associated with the actual learning results (Atkinson et al., 2022). The low predictive power of the studies in this

study confirms this critique, indicating that perceived teaching clarity, helpfulness, and feedback timeliness might not be adequate predictors of effective teaching when measured independently. This supports the argument that more multidimensional frameworks to assess the quality of instruction require both subjective and objective measures.

In policy and international education terms, the findings indicate the problems of implementing the teaching effectiveness in the standardized evaluation systems. The quality of teachers is highlighted by international organizations like UNESCO, the World Bank, and the OECD as one of the determinants of educational progress, but the authors also acknowledge that teaching effectiveness in different settings is more complicated to measure (Souza, 2024; Sung, 2024). The low correlation rates of the present study indicate that simplified measures might lack the ability to reflect the overall structural and institutional aspects of teaching and learning. In addition, the importance of education in encouraging lifelong learning and whole-body development is not limited to the short-term academic success, which makes it difficult to quantify the performance of teaching (Akther, 2020).

The implications of the findings can be applied to teacher education and professional development as well. The current studies highlight the importance of teacher preparation and continuous professional learning as a key to enhancing teaching practices and student achievement (Darling-Hammond, 2016). Nevertheless, the findings of this research point to the possibility that the effects of narrow-focused emphasis on specific teaching characteristics might not lead to significant academic outcomes. Rather, a more comprehensive strategy that incorporates pedagogical knowledge, contextual awareness, and adaptive pedagogic might be required. Such an approach is especially applicable to modern educational settings that are quite influenced by the high rate of technological change and disruption like the COVID-19 pandemic that has radically transformed the practices of teaching and learning (Allen et al., 2020; Quezada et al., 2020).

Moreover, it is significant that there are no robust predictive relationships, which begs significant questions regarding equity and diversity in educational research. The literature in educational psychology emphasizes the importance of race, socio-economic background, and cultural context as the factors that have to be taken into consideration when analyzing the learning outcomes (Kumar and DeCuir-Gunby, 2023). Such variables were not present in the dataset of the present research, which could be a constraint in finding significant differences in student performance. This limitation highlights the need to include wider socio-cultural aspects in future studies to gain a clearer insight into the intricacies of teaching effectiveness.

These results indicate that even though the clarity of teaching, its helpfulness, and feedback timeliness are theoretically significant, their direct influence on student outcomes cannot be easily identified in simplified quantitative analyses. The findings prompt a more multidimensional and careful investigation of teaching effectiveness, which would include the

interaction of instructional practices, and student features, and contextual factors. It is therefore necessary that in future studies, the investigators should go beyond single measures and consider more elaborate constructs such as longitudinal and sophisticated analytical models to help in the understanding of the intricacy of teaching and learning procedures.

5. Conclusion

This paper investigated the connection between the main instructional features, such as the clarity of teaching, its helpfulness, and the timeliness of feedback and the academic performance of students based on a quantitative analysis of secondary data. The results suggest that these elements of teaching do not play a major role in predicting student performance, or final grades, and correlation and regression analysis shows that they possess little explanatory value. These findings refute existing views in the literature that gains in perceived teaching quality directly correlate into quantifiable academic success. Rather, the study highlights the complexity of teaching effectiveness, indicating that the outcomes of students are affected by a larger number of interacting factors, such as engagement behaviors, contextual conditions, and psychological processes. The low associations also present significant questions about the validity of the popular teaching evaluation measures, especially the measures which are based on student perceptions. Practically, the results suggest that emphasizing on the single aspects of instructional qualities might not be appropriate to improve student performance and it is necessary to consider more integrated and multidimensional models of teaching assessment and improvement. Although the research is a contribution to the current discussion on the effectiveness of teaching, the lack of contextual variables and the use of secondary data restrict the generalization of the results. Future studies need to be more enriched with data and sophisticated analytical platforms to represent more of the dynamics that surround teaching and learning in higher education.

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