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The Relationship Between Interaction and Student Achievement on Online Education Platforms

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Abstract:

Online education has become an indispensable component of modern teaching, and the study of the relationship between its interactive modalities and academic performance is significant for the optimization of teaching strategies. Although existing research has explored the impact of online interaction on learning outcomes, an in-depth analysis targeting university students in specific regions still warrants further investigation. Therefore, the present study employed a survey methodology to collect data on the usage of online education platforms and academic performance from 324 university students at Jiangxi Vocational College of Mechanical & Electrical Technology. Descriptive statistical analysis was then conducted on the collected data. The results indicate a positive correlation between online learning and academic performance, with only a small number of students reporting that online learning has harmed their grades. While it is not possible to assert a direct causal relationship between the time and pattern of online interactive learning and grades, it is evidence that increased viewing of live courses and interactive participation does help students enhance their problem-solving abilities and significantly impacts their academic performance. Future research could explore the specific effects of different interactive tools and methods within online education platforms on academic performance, as well as how to design more effective online teaching activities to improve students' motivation and grades. Additionally, with the advancement of artificial intelligence and big data technologies, future studies could leverage these technologies for a more in-depth analysis of online learning behaviors, providing support for personalized online teaching.

Keywords: Online education platform; Academic performance; College students; Statistical analysis

1. Introduction

With the rapid development of information technology and artificial intelligence, individuals generate vast amounts of data at any time from any location, which continuously influences various aspects of life and work [1]. The modalities of education have also undergone transformations propelled by emerging technologies [2]. Interactive modes offered by online platforms, such as discussions with teachers and students, real-time Q&A sessions, assignment submissions, and online assessments, have not only altered traditional teaching methods but also provided students with distinct learning experiences.

Research on the correlation between the interactivity of online education platforms and students' academic performance holds significant value for enhancing the quality of online teaching [3]. Scholars based on this research to optimize online educational models, proposing methods for improvement, adjusting the frequency of interactions, and modifying the content of these interactions. Furthermore, the enhancement of teaching proficiency can be achieved through this medium, making classroom interactions between teachers and students more effective, deepening the theoretical depth of interactive research, and highlighting high interactivity as a key feature of online education, thereby specifically targeting the improvement of academic performance [4]. Huang, based on the Unified Theory of Acceptance and Use of Technology (UTAUT) model, constructed a model for the willingness to accept online teaching and through empirical analysis found that performance expectancy, social influence, perceived enjoyment, and facilitating conditions have a significant positive impact on college students' willingness to accept online teaching. Based on this, relevant suggestions are proposed to improve the willingness of college students to accept online teaching [5]. Chen, taking the smart education platform for primary and secondary schools as a case study, established an analytical framework for the influencing factors of user willingness to use, and study the online educational resources of the smart education platform for primary and secondary schools based on the Technology Acceptance Model (TAM). The analysis results show that variables such as perceived usefulness, work relevance, external motivation, outcome expectations, perceived ease of use, simplicity, subjective norm, and public image have a significant positive impact on the willingness to use [6]. Liu, taking master's students from the Education University of Hong Kong as the research subjects, discussed the changes in autonomous learning ability and academic self-concept of master's students under different teaching modes through interviews. The research results show that under the blended teaching mode, the autonomous learning ability of master's students has improved, which is related to the improvement of the learning environment, learning motivation, and the positivity of using autonomous learning strategies [7]. The study emphasizes the importance of fostering students' autonomous learning abilities during the teaching process and suggests employing diverse teaching methods to stimulate students' motivation and engagement [7]. Although some studies have explored the effects of online interaction and its potential benefits are widely acknowledged, the specific impacts on regions, schools, and populations are not yet fully understood. Moreover, with the increasing demand for personalized learning, how to maximize learning outcomes through online interaction remains a challenge that needs to be addressed.

This study investigates the correlation between interactive characteristics on online education platforms and academic performance among college students at Jiangxi Mechanical and Electrical Vocational and Technical College. By analyzing relevant literature, formulating hypotheses, and designing questionnaires, data is collected and statistically analyzed to understand the impact of teacher-student interaction on academic performance and its associated factors. The aim is to provide insights for the enhancement of college students' autonomous learning abilities and the reform of teaching methodologies.

2. Data Sources and Statistical Analysis

2.1 Survey Information

This paper relies on 'questionnaire star' survey platform, taking Jiangxi Vocational College of Mechanical and Electrical Technology college students as the survey object. The questionnaire consists of two parts. The first part is the personal information of the respondents, including gender, grade and professional field. The second part is the time of online learning, the type of interaction, the quality of interaction and the influence of interaction on learning effect. Finally, 324 valid questionnaires were collected, which 72.84% were boys and 27.16% were girls. 90% are senior high school students and the proportion of science and engineering majors is slightly higher.

2.2 Basic Statistical Analysis of Online Education Platforms

The horizontal axis represents the time of use per week. The vertical axis represents the percentage of users.

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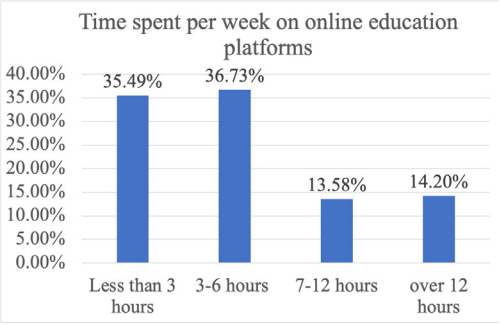

Fig. 1 Time spent on online education platforms per week (Photo/Picture credit: Original).

From Figure 1, it can be concluded that 36.73% of people spend 3-6 hours per week studying on online education platforms approximately and 35.49% of people spend less than 3 hours. In addition, 14.2% of people spend more than 12 hours and 13.58% of people spend 7-12 hours. Therefore, there is a higher percentage of students spend between 0 to 6 hours per week on online education platforms, which is approximately 2.5 times the percentage of students who spend 7 hours or more per week on these platforms. The horizontal axis represents different types of online learning. The vertical axis represents the percentage of users.

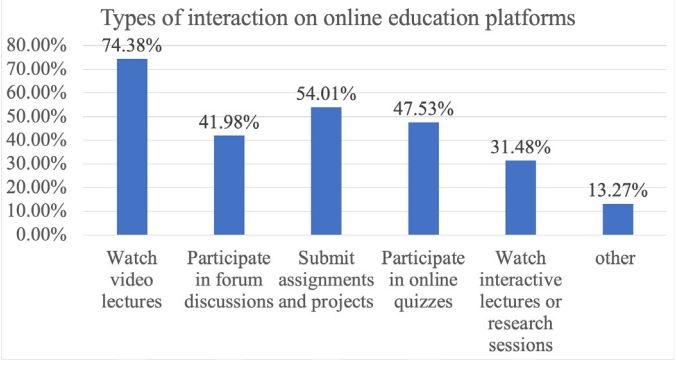

Fig. 2 Types of Interactive Participation on online Education Platforms (Photo/Picture credit: Original).

From Figure 2, participating in watching video lectures is the most common type of interaction that respondents typically engage in on online education platforms, reaching 74.38%. Next is submitting assignments and projects, accounting for 54.01%. The proportion of participants in online quizzes is 47.53%. The percentage of participating in forum discussions and watching interactive lectures or research meetings are 41.98% and 31.48% respectively. The proportion of other types of interactions is relatively low, only 13.27%. Overall, watching video lectures, and submitting assignments and projects are the interactive types with high participation among respondents on online education platforms.

The horizontal axis represents the evaluation of interactive quality on online education platforms, and the vertical axis represents the percentage of users.

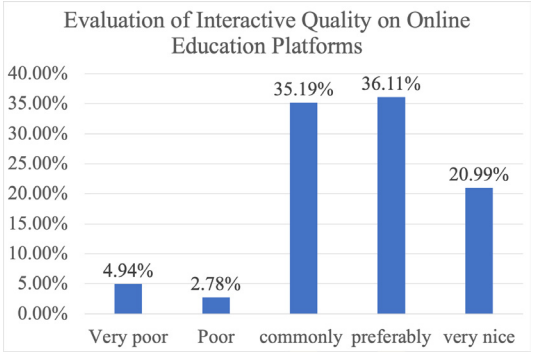

Fig. 3 Evaluation of Interactive Quality on Online Education Platforms (Photo/Picture credit: Original).

As can be seen from Figure 3, 36.11% of people think that the quality of interaction is perfect, and 20.99% of people think that the quality of interaction is very good. So 57.1% of people in total have a good or above evaluation of the quality of interaction. In contrast, only 7.72% rated the quality of interaction as poor or very poor. As a result, most people have a more positive assessment of the quality of interaction on online education platforms. Based on the investigation of online learning satisfaction of students majoring in preschool education in a higher vocational college in Wuhan, Pearson's correlation coefficient was employed to test the correlation between the five dimensions included in the questionnaire and overall satisfaction. To further explore the quantitative relationships between variables, the study used student, teacher, course, platform, and interaction as independent variables and the total score of online learning satisfaction as the dependent variable for regression analysis. This approach aimed to explore the state of student satisfaction with online learning, using a cutoff value of 3 for each dimension score. The overall average satisfaction score is 3.857, which is greater than the midpoint value of 3, indicating a basic level of satisfaction with online learning, consistent with our survey results [8]. Therefore, it is essential to recommend and promote online teaching platforms for educational institutions, and advance teaching reforms and innovations, such as breaking spatial and temporal limitations, facilitating resource sharing, and providing personalized services. This approach can guide learners to recognize that 'online education, like classroom teaching, is a modern method of education with its own advantages' [9]. It is crucial to enable students and teachers to better adapt to the blended learning model and break away from

fixed educational patterns [10].

2.3 Correlation Analysis

The results show that online education platforms will create a good cycle for academic performance generally. The factors below will influence the quality of learning and the variation of scores. First, the requirement for college teachers' ability of intelligent teaching is very high in online teaching, teachers need to combine the teaching content with this new teaching model [11]. Both the timeliness of interaction and the depth of interaction content will have a positive effect on academic performance. Second, teachers and students do not have enough face-to-face communication in the process of online learning, which means that it's difficult to guarantee the effect of teaching, which leads some students to think online learning has no impact on their academic performance, even causing lower grades [12]. Online learning has hindered mental bonds and eye contact, students may find it difficult to grasp the key points of the knowledge, and teachers also can't acquire students' circumstances in time [11]. Facing the diversity of learning platforms, college students urgently require improving the ability to study independently and to be familiar with two teaching models (online and offline) [13].

The horizontal axis represents how much improvement has been achieved through online interaction, the vertical axis represents the percentage of users.

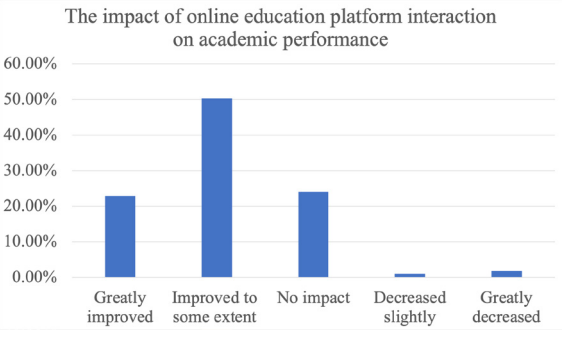

Fig. 4 The impact of online education platform interaction on academic performance (Photo/Picture credit: Original).

According to Figure 4, most of the interviewees believe that online education platform has a positive effect on their academic performance.50.31% of the interviewees indicate that their academic performance has improved to some extent, and 22.48% of the interviewees suppose their academic performance has improved a lot. On the contrary, only a few interviewees hold the view that academic performance has decreased a little or decreased dramatically, accounting for 0.93% and 1.85% respectively. Therefore, the majority of the interviewees consider the online education platform to have a positive effect on academic performance.

By the interaction of the college students in the guiding-learning phase, the Instruction phase as well as promoting-learning phase, and the impact on learning quality, Li summarizes the arithmetic mean and conducts descriptive statistics [4]. The research finds that when the quality of interaction in class is relatively good, the quality of learning also improves, the mean value is 2.7. This shows that even in online classes interaction still plays a significant role in students learning quality [4]. Because online education platforms have certain unique characteristics, the data of quizzes, class duration, and homework submission are fragmented and cannot be recorded in traditional classes [9]. For students, as the classes end, it is gradually forgotten. In contrast, an online learning platform could retain data for a long time, teachers could see the learning duration of students for each learning resource and the answering situation of diagnostic questions. Students can know about themselves, as well as the situation of other students, which plays a role in inspiring learning [14]. This is consistent with the result of 50.31% of interviewees (academic performance has improved).

A small number of people's grades have dropped because the widespread application of online education makes 'teaching' easier, but online education lacks face-to-face communication and interaction, which makes it difficult to guarantee the results of students' learning [12].

3. Conclusion

The article aims to fill the academic gap of how to achieve the maximum learning effect through online interaction by studying the correlation between online interaction in educational platforms and students' academic performance, results are expected to enhance the online interactive learning efficiency of vocational college students to improve their academic performance, promote the allocation of government resources, improve the utilization rate of educational resources, inspire other researchers to think deeply and find research directions, provide data support and ultimately promote the relationship between science and technology and online research, the frequency of online interaction and students' academic performance to maximize the online learning effectiveness of students. The paper mainly uses statistical methods to enrich the research achievements in the field of education and uses online interactive teaching methods to promote the comprehensive development of students. It provides a reference for policy makers in education and continuously improves the online interactive teaching policy to better meet the learning needs of students, thereby promoting the sustain-

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able development of online interactive education.

This current study only uses a single sample from one school, which may not be representative and cannot provide a general understanding of the relative universal impact of online education interactions on the grades of all students of the same age group. Additionally, the interaction modes mentioned in the survey questionnaire may not be comprehensive enough to affect the experimental results. Alternatively, some of the students who filled out the survey questionnaire may not have filled it out based on their actual situation, leading to certain biases in the results. Based on the shortage of the current study, some suggestions and improvements for future related research include, expanding range, not just within one school, but also across schools and regions, making the study more persuasive and generalizable. In addition, the analysis was conducted for vocational college students in this study. Future researchers may also explore what different behavioral differences exist among students of other student groups in educational platforms and how these differences affect their academic performance. Finally, it is hoped that in the future, actual teaching methods and strategies can be improved based on the results of the study, forming a virtuous cycle.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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