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Analysis of the impact of online learning on the GPA of Bina Nusantara University students during the Covid-19 pandemic

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ABSTRACT

This study examines the effect of online learning on the Grade Point Average (GPA) of Bina Nusantara University students during the COVID-19 pandemic. The shift from face-to-face learning to online instruction was implemented in response to government policies aimed at reducing the spread of COVID-19 in higher education institutions. Although online learning allowed academic activities to continue through platforms such as Zoom, Google Meet, and Microsoft Teams, it also created challenges related to Internet access, data costs, student engagement, and learning effectiveness. This study used a quantitative approach involving 100 Bina Nusantara University students selected through purposive sampling. Data were collected using an online questionnaire and analyzed using IBM SPSS. The analysis included validity, reliability, normality, classical assumption, and simple linear regression tests. The results showed that the questionnaire items for both online learning and GPA variables were valid and reliable, with Cronbach's alpha values above 0.70. The regression analysis produced an R-squared value of 0.971, indicating that online learning explained 97.1% of the variation in students' GPA, while the remaining 2.9% was explained by other factors. The significance test showed a p-value of 0.000 and a t-value of 57.760, confirming the statistically significant effect of online learning on students' GPA. The regression equation, $Y = 0.099 + 0.975X$, indicates that an increase in the effectiveness of online learning is associated with an increase in GPA. The study concludes that online learning significantly influenced the GPA of students at Bina Nusantara University during the pandemic. However, further research is recommended to address the methodological limitations and explore additional factors affecting academic performance.

Keywords: Bina Nusantara University; COVID-19 pandemic; GPA; online learning; student academic performance

1. INTRODUCTION

The COVID-19 pandemic forced higher education institutions to reorganize teaching and learning within a short period. In Indonesia, this transition was reinforced through the Circular Letter of the Directorate General of Higher Education No. 1 of 2020, which instructed universities to prevent the spread of COVID-19 by shifting academic activities away from conventional, face-to-face delivery (Directorate General of Higher Education, 2020). As a result, online learning became the most practical alternative for maintaining instructional continuity while reducing physical interaction between lecturers and students. This emergency transition was not simply a technical change in learning media; it altered the way students accessed lectures, communicated with lecturers, completed assignments, sat for examinations, and managed their academic responsibilities, among others.

Online learning refers to instructional activities delivered through digital platforms and Internet-based communication, either synchronously or asynchronously. During the pandemic, universities commonly relied on video conferencing and learning management tools such as Zoom, Google Meet, Microsoft Teams, Google Classroom, and other digital applications. These platforms allow students to attend classes from different locations and provide flexibility in terms of time, access, and learning resources. Such flexibility is one of the major strengths of online education because it enables learning to continue during crisis conditions and may support student-centered learning (Dhawan, 2020). Similarly, Bao (2020) emphasizes that effective online teaching in higher education requires clear learning design, structured delivery, active student engagement, and timely lecturer feedback rather than merely transferring face-to-face lectures into virtual meetings.

However, the sudden implementation of online learning has also produced several academic and non-academic challenges. Unlike well-planned online education, emergency remote learning often occurs under pressure, with limited preparation, uneven digital readiness, and unequal access to technology (Adedoyin & Soykan, 2023). In the Indonesian higher education context, students frequently face unstable Internet connections, limited access to devices, high data costs, and difficulty maintaining concentration during long virtual sessions (Rukmini et al., 2023). These challenges are important because the effectiveness of online learning depends not only on the availability of platforms but also on students' ability to participate consistently, understand course materials, and interact meaningfully with lecturers and peers.

Simultaneously, online learning may create opportunities for students to develop greater autonomy and self-regulated learning. Because students cannot rely entirely on direct classroom supervision, they are required to manage their schedules, search for additional academic resources, and take responsibility for completing assignments. Kuo et al. (2014) found that learner-content interaction, learner-instructor interaction, internet self-efficacy, and self-regulated learning are important predictors of student satisfaction in online education. This suggests that the academic impact of online learning may differ among students, depending on their digital competence, motivation, learning discipline, and capacity to adapt to independent learning.

One important indicator used to evaluate students' academic achievement in higher education is the GPA, known in Indonesia as *Indeks Prestasi Kumulatif* (*IPK*). The GPA reflects the cumulative academic performance of students based on scores obtained from assignments, projects, examinations, and other course assessments. During the pandemic, changes in the learning mode may have influenced the GPA in different ways. On the one hand, online learning could support academic performance by providing students with wider access to digital references, more flexible study time, and opportunities to collaborate with peers. Nuriansyah (2020), for example, reported that online media could support learning outcomes among economics education students during the early stages of the pandemic. However, online learning may also reduce academic achievement when students experience poor connectivity, limited interaction, learning fatigue, or low understanding of course materials. Rahman (2021) found that learning outcomes in higher education declined during the pandemic period, showing that the academic consequences of online learning were not uniform across institutions and student groups.

This mixed evidence makes it necessary to examine how online learning affected the GPA of Bina Nusantara University students during the COVID-19 pandemic. The issue is not only whether GPA increased or decreased but also why such changes occurred and how students attempted to maintain or improve their academic performance under online learning conditions. Understanding this relationship is important for lecturers, university administrators, and education stakeholders because GPA changes may reflect the advantages and weaknesses of emergency online learning. If the GPA improves, it is necessary to determine whether the improvement reflects better learning, greater flexibility, assessment changes, or easier access to online resources. If GPA declines, it is important to identify the barriers that prevent students from performing effectively.

Therefore, this study aimed to analyze the influence of online learning on the GPA of Bina Nusantara University students during the COVID-19 pandemic. Specifically, this study seeks to explain why online learning may affect GPA, identify how students maintain or improve their GPA during online learning, and examine whether there are differences between students' GPA during online learning and face-to-face learning. The scope of this study is limited to Bina Nusantara University students who experienced online learning during the pandemic, with data collected through questionnaires. By focusing on this context, this study is expected to provide empirical insights into the academic consequences of online learning and contribute to the development of more adaptive, communicative, and effective learning systems in higher education.

2. LITERATURE REVIEW

Online learning, also referred to as e-learning or online courses, is a mode of instruction that uses information and communication technology to deliver teaching and learning through Internet-based platforms. In higher education, online learning enables lecturers and students to interact without being physically present in the same classroom environment. Course materials can be distributed through text files, presentation slides, videos, learning management systems, and video conferencing platforms. This model allows learning activities to continue across different locations and gives students access to academic content through computers, mobile phones, tablets, and other digital devices. During the COVID-19 pandemic, online learning became an emergency response to maintain educational continuity when face-to-face instruction was restricted (Dhawan, 2020).

The concept of online learning is closely related to flexibility, accessibility, and digital interactions. Unlike conventional classroom learning, online lectures can be conducted synchronously through live meetings or asynchronously through recorded materials, discussion forums, and independent assignments. This flexibility allows students to access learning materials at different times and from different places, provided that an internet connection and digital devices are available. However, effective online learning requires more than just the use of digital platforms. Bao (2020) argues that online teaching in higher education requires structured learning design, clear instructional organization, active interaction, and continuous feedback from lecturers. Without these elements, online learning may become a passive transfer of materials rather than an effective academic process that promotes learning.

Online learning offers several benefits for both lecturers and students alike. It reduces the need for physical mobility, lowers transportation costs, and allows learning to take place beyond the physical boundaries of a campus. Students can also save and revisit digital learning materials, which may support independent study and review before completing assignments or examinations. In addition, online platforms can support two-way communication through chat rooms, discussion forums, video meetings, and direct messages between students and lecturers. Kuo et al. (2014) found that learner-content interaction, learner-instructor interaction, internet self-efficacy, and self-regulated learning are important predictors of student satisfaction in online education. This indicates that students are more likely to benefit from online learning when they can interact meaningfully with the course materials, lecturers, and digital systems.

Despite its advantages, online learning creates significant challenges. Emergency online learning during the pandemic was often implemented quickly, with limited preparation and unequal access to

technology. Adedoyin and Soykan (2023) emphasized that the shift to online learning during COVID-19 exposed digital inequality, technical barriers, limited digital competence, and difficulties in maintaining student engagement. In Indonesia, these issues are also visible in higher education. Rukmini et al. (2023) show that Indonesian universities experienced both rapid growth and major challenges in online learning during the pandemic, including internet access problems, learning adaptation, and differences in institutional readiness. These barriers may influence students' participation, motivation, and academic performance negatively.

Students are the central actors in the online learning process. In higher education, students are expected to not only receive knowledge but also develop critical thinking, academic responsibility, creativity, and problem-solving skills. Online learning strengthens this expectation because students must manage their own learning time, complete assignments independently, seek additional information, and communicate actively when facing difficulties. Broadbent and Poon (2015) found that self-regulated learning strategies, including time management, effort regulation, metacognition, and help-seeking, are associated with academic achievement in higher education online courses. Therefore, the success of online learning depends partly on students' ability to regulate their learning behavior.

Academic achievement refers to the measurable outcome of students' learning processes. In universities, one common indicator of academic achievement is GPA. The GPA summarizes students' cumulative performance across courses, assignments, projects, and examinations. York et al. (2015) explain that academic achievement is one of the main components of academic success, although broader academic success may also include skills development, satisfaction, persistence, and career preparation. In this study, GPA was used as the main indicator because it provides a measurable representation of students' academic performance before and during online learning.

Several factors may influence students' GPA during online learning. Internal factors include motivation, learning discipline, health conditions, self-efficacy, interest, readiness, and intellectual ability. External factors included family support, access to learning facilities, economic conditions, campus policy, lecturer support, and internet connectivity. Richardson et al. (2012) found that university students' academic performance is related not only to cognitive ability but also to psychological factors such as self-efficacy, motivation, and effort regulation. Therefore, changes in GPA during online learning should not be interpreted as the result of the learning mode itself. They may also reflect differences in student readiness, digital access, learning strategies, and assessment conditions during the pandemic.

Based on this review, online learning can influence students' academic achievement in both positive and negative ways. It may improve the GPA by increasing flexibility, access to materials, and independent learning opportunities. However, it may also reduce GPA when students experience poor Internet connections, weak engagement, low self-regulation, or limited interaction with lecturers. Therefore, examining the influence of online learning on Bina Nusantara University students' GPA is important for understanding how digital learning affected academic performance during the COVID-19 pandemic.

3. RESEARCH METHODOLOGY

This study employed a quantitative explanatory research design to examine the influence of online learning on students' GPA during the COVID-19 pandemic. A quantitative approach was considered appropriate because the study aimed to measure the relationship between two variables numerically and test whether online learning contributed to changes in students' Academic Performance (AP). Explanatory research is commonly used when a study seeks to identify the effect of an independent variable on a dependent variable through statistical analysis (Creswell & Creswell, 2018).

The study population consisted of Bina Nusantara University students who experienced online learning during the COVID-19 pandemic. In this study, the population was limited to 100 students who were relevant to the research scope. The respondents were selected because they had participated in online lectures and were able to provide information regarding their academic experience and changes in GPA during the online learning period. Therefore, this study focused specifically on students who had direct experience with the learning system being investigated.

Purposive sampling was used in this study. Purposive sampling is a non-probability sampling technique in which respondents are selected based on specific criteria determined by the researcher (Sekaran & Bougie, 2016). This technique was suitable because the study required respondents who had experienced online learning and were able to report whether their GPA had changed during the pandemic period. The inclusion criteria were as follows: students of Bina Nusantara University, students who had participated in online learning, and students who were willing to complete the questionnaire. Based on these criteria, 100 respondents were selected as the research sample.

Data were collected using an online questionnaire distributed via Google Forms. The use of an online questionnaire was appropriate because the study was conducted during a period when physical interaction was limited, and students were already familiar with digital communication platforms. The questionnaire was designed to obtain information about students' perceptions of online learning and their GPA during the pandemic. The instrument included questions related to the effectiveness of online learning, accessibility of online lectures, student participation, learning convenience, and perceived changes in academic performance.

This study consisted of two main variables: the independent variable was online learning, which refers to the implementation of lectures through Internet-based platforms without face-to-face classroom meetings. Online learning was assessed based on students' perceptions of its effectiveness, flexibility, accessibility, and contribution to the learning process. The dependent variable was GPA, which refers to students' cumulative academic achievement, as reflected in their university academic record. GPA was used as the main indicator of academic performance because it represents students' overall achievements across courses, assignments, examinations, and other academic assessments.

Data were analyzed using simple linear regression. Simple linear regression is a statistical technique used to examine the relationship and influence between one independent variable and one dependent variable (Lind et al., 2018). In this study, regression analysis was used to determine whether online learning influenced students' GPA. The regression model used in this study was formulated as follows:

$$Y = a + bX$$

where Y is represents students' GPA, a is the constant, b is the regression coefficient, and X is online learning. Through this model, this study examined whether changes in students' perceptions of online learning were associated with changes in GPA. A positive regression coefficient would indicate that better perceptions of online learning are associated with a higher GPA, while a negative coefficient would indicate that online learning is associated with a lower GPA.

Before conducting the regression analysis, the questionnaire responses were organized and coded for statistical processing. Descriptive statistics were used to summarize the characteristics of the responses, and regression analysis was used to test the relationship between the research variables. The results of the analysis were then interpreted to answer the research questions concerning whether online learning affected GPA, how students maintained or improved their GPA, and whether GPA differed between online and face-to-face learning conditions.

Ethical considerations were also observed during the data collection process. Respondents participated voluntarily, and the questionnaire was distributed only to students who were willing to respond. The data were used solely for academic research purposes, and the respondents' identities were treated confidentially.

4. RESULTS AND DISCUSSION

4.1. Results

4.1.1. Overview of the Statistical Analysis

This section presents the empirical results and discussion of the study on the influence of online learning on the GPA of Bina Nusantara University students during the COVID-19 pandemic. The analysis was conducted using IBM SPSS Statistics with a significance level of 5% ($\alpha = 0.05$). The statistical procedures included validity, reliability, normality, classical assumption, and simple linear regression testing. The independent variable was online learning, and the dependent variable was students' GPA. The overall purpose of the analysis was to determine whether students' experience of online learning was statistically associated with their academic performance during the pandemic.

Online learning became a central mode of university instruction during the pandemic because it allowed teaching and learning to continue when physical meetings were restricted. However, previous studies have shown that online learning is not automatically effective; its outcomes depend on instructional design, internet access, student engagement, interaction, and self-regulated learning (Bao, 2020; Dhawan, 2020; Kuo et al., 2014). Therefore, the results of this study are interpreted not only as numerical outputs but also as evidence of how students adapt to digital learning conditions.

This study used questionnaire responses from 100 students. The questionnaire consisted of five indicators for online learning (X1-X5) and five indicators for GPA-related academic performance (Y1-Y5). The total score for each variable was used in subsequent statistical analyses. The original respondent data table is retained below to preserve the structure and numerical values of the source document (see Table 1):

Table 1. Respondent Data for Online Learning and GPA Variables

No	Online Learning (X)					Total X	GPA (Y)					Total Y
	X1	X2	X3	X4	X5		Y1	Y2	Y3	Y4	Y5	
1	2	4	4	4	2	16	2	3	4	4	2	15
2	3	4	5	5	3	20	3	4	4	5	3	19
3	4	4	3	3	4	18	4	4	3	2	4	17
4	3	4	4	4	3	18	3	4	3	4	3	17
5	3	3	4	4	3	17	3	3	4	4	3	17
6	4	4	5	5	4	22	4	4	5	5	4	22
7	3	5	5	5	3	21	3	5	5	3	3	19
8	5	4	5	5	5	24	5	4	5	5	5	24
9	4	3	3	3	4	17	4	3	3	3	4	17
10	3	5	4	4	3	19	3	5	4	4	3	19
11	3	3	3	3	3	15	3	3	3	3	3	15
12	3	5	4	4	3	19	3	5	4	4	3	19
13	2	4	3	3	2	14	2	4	3	3	2	14
14	3	4	3	3	3	16	3	4	3	3	3	16
15	4	4	4	4	4	20	4	4	4	4	4	20
16	5	4	4	4	5	22	5	4	4	4	5	22
17	3	5	5	5	3	21	3	5	5	5	3	21
18	5	5	5	5	5	25	5	5	5	5	5	25
19	3	4	5	5	3	20	3	4	5	5	3	20
20	4	5	3	3	4	19	4	5	3	3	4	19
21	3	4	5	5	3	20	3	4	5	5	3	20
22	3	5	4	4	3	19	3	5	4	4	3	19
23	5	5	5	5	5	25	5	5	5	5	5	25
24	5	5	5	5	5	25	5	5	5	5	5	25
25	4	4	5	5	4	22	4	4	5	5	4	22
26	3	5	5	5	3	21	3	5	5	5	3	21
27	4	4	5	5	4	22	4	4	5	5	4	22

28	2	4	4	4	2	16	2	4	4	4	2	16
29	3	4	4	4	3	18	3	4	4	4	3	18
30	4	3	3	3	4	17	4	3	3	3	4	17
31	2	4	5	5	2	18	2	4	5	5	2	18
32	3	4	3	3	3	16	3	4	3	3	3	16
33	3	4	4	4	3	18	3	4	4	4	3	18
34	5	3	4	4	5	21	5	3	4	4	5	21
35	4	5	5	5	4	23	4	5	5	5	4	23
36	3	4	4	4	3	18	3	4	4	4	3	18
37	2	4	5	5	2	18	2	4	5	5	2	18
38	4	4	3	3	4	18	4	4	3	3	4	18
39	2	4	4	4	2	16	2	4	4	4	2	16
40	3	3	4	4	3	17	3	3	4	4	3	17
41	4	4	5	5	4	22	4	4	5	5	4	22
42	2	5	5	5	2	19	2	5	5	5	2	19
43	4	4	5	5	4	22	4	4	5	5	4	22
44	3	5	4	4	3	19	3	5	4	5	3	20
45	4	3	4	4	4	19	4	3	4	4	4	19
46	3	4	4	4	3	18	3	4	4	4	5	20
47	2	3	4	4	2	15	2	3	4	4	5	18
48	3	3	3	3	3	15	3	3	4	4	3	17
49	2	5	3	3	2	15	2	5	3	3	2	15
50	3	4	4	4	3	18	3	4	4	4	3	18
51	3	4	4	4	3	18	3	4	4	4	3	18
52	5	5	5	5	5	25	5	5	5	5	5	25
53	3	4	4	4	3	18	3	4	4	4	3	18
54	4	4	4	4	4	20	4	4	4	4	4	20
55	5	4	5	5	5	24	5	4	5	5	5	24
56	4	4	4	4	4	20	4	4	4	4	4	20
57	3	5	4	4	3	19	3	5	4	4	3	19
58	5	4	4	4	5	22	5	4	4	4	5	22
59	4	5	5	5	4	23	4	5	5	5	4	23
60	3	5	4	4	3	19	3	5	4	4	3	19
61	2	4	5	5	2	18	2	4	5	5	2	18
62	2	4	4	4	2	16	2	4	4	4	2	16
63	3	5	4	4	3	19	3	5	4	4	3	19
64	4	4	5	5	4	22	4	4	5	5	4	22
65	5	5	4	4	5	23	5	5	4	4	5	23
66	4	4	5	5	4	22	4	4	5	5	4	22
67	3	5	5	5	3	21	3	5	5	5	3	21
68	2	4	4	4	2	16	2	4	4	4	2	16
69	4	4	4	4	4	20	4	4	4	4	4	20
70	5	4	5	5	5	24	5	4	5	5	5	24
71	2	4	4	4	2	16	2	4	4	4	2	16
72	5	4	5	5	5	24	5	4	5	5	5	24
73	5	4	3	3	5	20	5	4	3	3	5	20
74	2	5	5	5	2	19	2	5	5	5	2	19
75	3	3	4	4	3	17	3	3	4	4	3	17
76	4	4	5	5	4	22	4	4	5	5	4	22
77	5	5	5	5	5	25	5	5	5	5	5	25
78	4	4	5	5	4	22	4	4	5	5	4	22
79	3	5	5	5	3	21	3	5	5	5	3	21
80	3	5	4	4	3	19	3	5	4	4	3	19
81	2	3	3	3	2	13	2	3	3	3	2	13
82	1	5	4	4	1	15	1	5	4	4	1	15
83	4	3	3	3	4	17	4	3	3	3	4	17
84	2	4	3	3	2	14	2	4	3	3	2	14
85	2	4	4	4	2	16	2	4	4	4	2	16
86	5	4	4	4	5	22	5	4	4	4	5	22

87	5	5	5	5	5	25	5	5	5	5	5	25
88	4	4	4	4	4	20	4	4	4	4	4	20
89	3	4	5	5	3	20	3	4	5	5	3	20
90	2	5	3	3	2	15	2	5	3	3	2	15
91	4	4	4	4	4	20	4	4	4	4	4	20
92	2	4	5	5	2	18	2	4	5	5	2	18
93	1	4	3	3	1	12	1	4	3	3	1	12
94	4	4	4	4	4	20	4	4	4	4	4	20
95	2	3	4	4	2	15	2	3	4	4	2	15
96	4	4	5	5	4	22	4	4	5	5	4	22
97	3	5	5	5	3	21	3	5	5	5	3	21
98	4	4	5	5	4	22	4	4	5	5	4	22
99	3	3	3	3	3	15	3	3	3	3	3	15
100	2	5	4	4	2	17	2	5	4	4	2	17

4.1.2. Validity Test

Validity testing was conducted to examine whether each item in the questionnaire measured its intended variable. In survey-based quantitative research, item validity is important because inaccurate items may produce misleading conclusions, even when the statistical model appears significant. The online learning variable consisted of five items: The calculated correlation values for X1, X2, X3, X4, and X5 were 0.631, 0.201, 0.582, 0.582, and 0.631, respectively. Based on the decision rule used in the study, all values were higher than the reference value; therefore, the five items were considered valid (see Table 2 and Table 3).

Table 2. Item-Total Statistics for the Online Learning Variable

Item-Total Statistics				
Item	**Scale Mean if Item Deleted**	**Scale Variance if Item Deleted**	**Corrected Item-Total Correlation**	**Cronbach's Alpha if Item Deleted**
X1	15.9200	5.105	.631	.660
X2	15.1000	8.030	.201	.793
X3	15.0500	6.492	.582	.688
X4	15.0500	6.492	.582	.688
X5	15.9200	5.105	.631	.660

Table 3. Validity Test of the Online Learning Variable (X)

Question items	R count	Sign	R table	Decision
X1	0.631	>	-0.17	H0 accepted
X2	0.201	>	-0.17	H0 accepted
X3	0.582	>	-0.17	H0 accepted
X4	0.582	>	-0.17	H0 accepted
X5	0.631	>	-0.17	H0 accepted

The GPA variable was also tested using five indicators: Y1, Y2, Y3, Y4, and Y5. The calculated correlation values were 0.623, 0.181, 0.571, 0.533, and 0.584, respectively. Based on the validity criterion applied in this study, all five items were classified as valid. This indicates that the questionnaire items used to represent students' GPA-related outcomes were acceptable for further analyses. Nevertheless, the relatively low correlation values for X2 and Y2 should be noted because they suggest that these items may require refinement in future instrument development (see Table 4 and Table 5).

Table 4. Item-Total Statistics for the Y Variable

Item-Total Statistics				
Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Y1	15.9400	4.986	.623	.624
Y2	15.1300	7.892	.181	.773
Y3	15.0800	6.377	.571	.660
Y4	15.0800	6.398	.533	.670
Y5	15.8900	5.069	.584	.645

Table 5. Validity Test of the GPA Variable (Y)

Question items	R count	Sign	R table	Decision
Y1	0.623	>	-0.17	H0 accepted
Y2	0.181	>	-0.17	H0 accepted
Y3	0.571	>	-0.17	H0 accepted
Y4	0.533	>	-0.17	H0 accepted
Y5	0.584	>	-0.17	H0 accepted

4.1.3. Reliability Test

For more details, see Table 6.

Table 6. Reliability Statistics for the Y Variable

Cronbach's Alpha	Number of Items
0.750	5

Reliability testing was conducted to assess the internal consistency of the questionnaire. Cronbach's alpha is commonly used to evaluate whether several items consistently measure the same construct. Tavakol and Dennick (2011) explained that Cronbach's alpha provides an estimate of internal consistency and is widely used in educational and social science research. In this study, the online learning variable obtained a Cronbach's alpha of 0.750. Because this value was higher than the threshold of 0.70 used in the study, the online learning items were considered to be reliable (see Table 7).

Table 7. Reliability Statistics for the Variable

Cronbach's Alpha	Number of Items
0.729	5

The GPA variable obtained a Cronbach's α of 0.729. This value also exceeded 0.70, indicating that the GPA-related items had an acceptable internal consistency. These findings suggest that the two main variables were measured with adequate consistency and could be used in regression analysis. The reliability results strengthen the quality of the instrument because the items were valid and sufficiently consistent in measuring their respective variables.

4.1.4. Normality Test

The normality test was used to determine whether the data distribution of the two variables met the assumption of normality. The significance value for online learning was 0.059, and that for GPA was 0.055. Both values were > 0.05. Therefore, the data for online learning and GPA were considered to be normally distributed according to the decision rule applied in this study. This result supports the use of parametric

analysis in the next stage because the observed variables did not violate the normality assumption (see Table 8 and Table 9).

Table 8. Normality Test Results for Online Learning and Student GPA

Variable	Kolmogorov-Smirnov Statistic	df	Sig.	Shapiro-Wilk Statistic	df	Sig.
Online Learning	.087	100	.059	.976	100	.062
Student GPA	.088	100	.055	.977	100	.077

Note: a. The Lilliefors Significance Correction was applied.

Table 9. Normality Test of Online Learning and GPA Variables

Variable	Sig	Sign	α	Decision
Online learning	0.059	>	0.05	H0 accepted
Student GPA	0.055	>	0.05	H0 accepted

4.1.5. Classical Assumption Test

Classical assumption tests were conducted to evaluate whether the regression model satisfied important statistical assumptions. The residual normality test showed a significance value of 0.000, which was lower than 0.05. This indicates that the residuals were not normally distributed. Although the main variables were normally distributed, the residual results suggest that the regression model should be interpreted cautiously. In regression analysis, non-normal residuals may affect the precision of inferential statistics, particularly when the sample size is limited or when the model is strongly influenced by a small number of observations (see Table 10 and Table 11).

Table 10. Residual Normality Test Results

Variable	Kolmogorov-Smirnov Statistic	df	Sig.	Shapiro-Wilk Statistic	df	Sig.
Unstandardized Residual	.365	100	.000	.521	100	.000

Table 11. Heteroscedasticity Test

Variable	Sig	Sign	α	Decision
Online learning	0.000	<	0.05	H0 accepted

The heteroscedasticity test also produced a significant value of 0.000. As this value was lower than 0.05, the correct statistical interpretation was that heteroscedasticity was present in the model. The table below is retained from the original document; however, the narrative interpretation follows the decision rule that sig. < 0.05 leads to the rejection of the null hypothesis of no heteroscedasticity. Heteroscedasticity means that the variance of the residuals is not constant across the different levels of the independent variable. This condition does not necessarily remove the existence of a relationship between online learning and GPA, but it can affect the accuracy of the standard errors and significance testing. Therefore, the regression findings should be interpreted as statistically meaningful but not free from model assumption limitations (see Table 12 and Table 13).

Table 12. Spearman's Rho Heteroscedasticity Test Results

Variable	Test Indicator	Online Learning	Unstandardized Residual
Online Learning	Correlation Coefficient	1.000	.795**
	Sig. (2-tailed)	—	.000
	N	100	100
Unstandardized Residual	Correlation Coefficient	0.795**	1.000

	Sig. (2-tailed)	.000	—
	N	100	100

Note: **Correlation is significant at the 0.01 level (2-tailed)

Table 13. Significance Test Result of Online Learning

Variable	Sig	Sign	α	Decision
Online learning	0.000	<	0.05	H0 accepted

4.1.6. Simple Linear Regression Analysis

Simple linear regression was used to examine the effect of online learning on students' GPA. The coefficient of determination (R-squared) was 0.971. This means that 97.1% of the variation in students' GPA was explained by the online learning variable, while the remaining 2.9% was explained by other variables not included in this model. Statistically, this result indicates a very strong relationship between online learning and the GPA. However, this value should be interpreted carefully because academic performance is usually influenced by multiple psychological, technological, social, and institutional factors. Richardson et al. (2012) showed that university students' academic performance is associated with motivation, self-efficacy, effort regulation, and other individual factors. Thus, the very high R-squared value may reflect a strong association, but it may also indicate overlap between the way online learning and GPA outcomes were measured in the questionnaire (see Table 14 and Table 15).

Table 14. Model Summary of the Simple Linear Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.986	0.971	0.971	0.10182

Note: Predictor: Online Learning. Dependent variable: GPA

Table 15. Regression Coefficients for the Effect of Online Learning on GPA

Model	Variable	B	Std. Error	Beta	t	Sig.
1	Constant	0.099	0.066	—	1.510	0.134
1	Online Learning	0.975	0.017	0.986	57.760	0.000

Note: Dependent variable: GPA

The significance test supported the existence of a statistically significant effect. The t-count value was 57.760 and the t-table value was 1.66. Because the t-count value was higher than the t-table value and the significance value was 0.000, which was lower than 0.05, the null hypothesis was rejected. Therefore, the results indicate that online learning significantly affects students' GPA. The regression equation obtained from the analysis was $Y = 0.099 + 0.975X$. This equation indicates that when the online learning score increases by one point, the GPA-related score is predicted to increase by 0.975 points. The relationship was positive, meaning that students who gave higher evaluations of online learning tended to report higher GPA-related outcomes.

4.2. Discussion

The positive and significant regression results suggest that online learning is associated with improved academic performance among respondents. This finding can be explained by the flexibility of online learning. During the pandemic, students were able to attend lectures from home, access digital learning materials, and complete academic tasks without traveling to campus. Online learning also enables students to revisit materials, search for additional references, and communicate through digital platforms.

Dhawan (2020) argues that online learning can support educational continuity during crisis conditions, especially when learning activities are designed to be accessible and flexible. In this study, the positive coefficient suggests that students who adapted well to online learning may have benefited from these factors.

These results are consistent with the student-centered nature of online education. Online learning often requires students to become more independent because lecturers cannot supervise the learning process in the same way as they do in face-to-face classrooms. Students must manage their time, complete assignments independently, and seek help when they encounter academic difficulties. Kuo et al. (2014) found that learner-content interaction, learner-instructor interaction, internet self-efficacy, and self-regulated learning are important predictors of satisfaction in online courses. Similarly, Broadbent and Poon (2015) found that self-regulated learning strategies such as time management, effort regulation, metacognition, and help-seeking are associated with academic achievement in higher education online courses. These findings support the interpretation that online learning can improve GPA when students can effectively regulate their learning behavior.

However, these findings should not be interpreted as evidence that online learning is always superior to face-to-face learning. Online learning during the COVID-19 pandemic was implemented under emergency conditions and was not planned. Some students may have benefited from flexibility, while others may have struggled with unstable Internet access, limited devices, household distractions, or reduced interaction with lecturers and classmates. Adedoyin and Soykan (2023) emphasized that pandemic-related online learning created both opportunities and challenges, including digital inequality, technical barriers, and engagement problems. Therefore, the significant effect found in this study should be understood within the specific context of the respondents and the measurement approaches used.

The heteroscedasticity results reinforce the need for cautious interpretation. Since the model showed unequal residual variance, the effect of online learning may not have been experienced evenly by all the students. Students with stable Internet connections, suitable devices, and supportive learning environments may have gained stronger academic benefits. In contrast, students with limited access or weaker digital readiness may have experienced difficulties despite a generally positive trend. This explains why online learning can produce different outcomes across student groups, even within the same institution.

The very high R-squared value also requires critical discussion. In educational research, GPA is rarely determined by a single factor. Academic performance is shaped by prior achievement, motivation, lecturer support, assessment design, digital literacy, socioeconomic conditions, psychological readiness, and the learning environment. Therefore, a model explaining 97.1% of GPA variation using only online learning may indicate that the questionnaire items were closely related, or that both variables were measured through similar self-reported perceptions. Common method bias can occur when predictor and outcome variables are collected from the same respondents using the same instrument format (Podsakoff et al., 2003). Future studies should reduce this risk by using actual GPA records, adding more independent variables, and applying more robust statistical methods.

From a practical perspective, the results indicate that universities should continue to improve the quality of online and blended learning. The positive effect of online learning suggests that digital learning can support academic achievement when students receive clear materials, interactive instruction, accessible platforms, and timely feedback on their work. Bao (2020) notes that effective online teaching requires careful instructional design rather than the simple transfer of classroom activities into virtual meetings. Therefore, lecturers should design online classes that encourage participation, provide structured learning pathways, and combine synchronous and asynchronous activities.

Universities should also provide support to students who face technological or learning barriers. Internet quota assistance, recorded lectures, flexible deadlines, academic counseling, and digital skills training can help reduce inequality in online learning. These supports are important because online learning success depends not only on students' motivation but also on the resources available to them. If universities want to maintain the academic benefits of online learning after the pandemic, they must treat it as an integrated learning system, rather than a temporary emergency solution.

Overall, the results show that online learning had a positive and statistically significant effect on the GPA of Bina Nusantara University students during the COVID-19 pandemic. The questionnaire items were valid and reliable, and the main variables met the normality requirements. Nevertheless, the residual normality and heteroscedasticity results showed that the regression model did not fully satisfy all the assumptions. Therefore, the findings should be interpreted with caution. The study provides useful evidence that online learning can support academic performance; however, future research should improve the model by using objective GPA data, broader samples, additional explanatory variables, and statistical techniques that are robust to assumption violations.

5. CONCLUSION AND RECOMMENDATIONS

This study examined the influence of online learning on the GPA of Bina Nusantara University students during the COVID-19 pandemic. Based on the statistical analysis, the findings indicate that online learning significantly affected students' GPA. The results of the validity and reliability tests showed that the research instruments were acceptable for measuring online learning and GPA. In addition, the normality test indicated that the main research variables were normally distributed, allowing the data to be processed using further statistical analysis.

The regression analysis confirmed that online learning contributed significantly to changes in students' GPA. This finding suggests that the shift from face-to-face learning to online learning during the pandemic influenced students' academic performance. Online learning provides flexibility, access to digital materials, and opportunities for students to continue their studies despite restrictions on physical classroom activities. However, the results should be interpreted with caution because the study had several limitations, particularly in relation to the quality and accuracy of the data and the statistical assumptions found in the analysis.

Overall, this study concludes that online learning played an important role in shaping the academic performance of Bina Nusantara University students during the COVID-19 pandemic. The findings show that online learning can support academic achievement when students can adapt to digital learning systems, participate actively, and maintain communication with lecturers. To improve student performance in online learning environments, stronger interactions between lecturers and students are needed. Students should also be encouraged to participate actively, ask questions during lectures, manage distractions, and use digital devices responsibly during learning activities.

Future studies should use a broader sample, more detailed academic performance data, and additional variables such as motivation, Internet access, learning environment, lecturer support, and student engagement. These improvements would provide a more comprehensive understanding of how online learning affects students' GPA in higher education.

Ethical Approval

Not Applicable

Informed Consent Statement

Not Applicable

Authors' Contributions

RBPC and AAK contributed to the conceptualization of the study, questionnaire development, and data collection. RVS, MHI, and VRMW contributed to methodology design, statistical analysis, and interpretation of the findings. AZA, RJ, and FDSP supported the literature review, data organization, and manuscript preparation. VRMW supervised the overall research process and served as the corresponding

author. All authors contributed to the discussion of the results, critically reviewed the manuscript, and approved the final version.

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The data presented in this study are available on request from the corresponding author due to privacy reasons.

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