Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 9 (2025)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

Analysis of Academic Performance and Geographic Disparities in Virtual University's BEd Early Childhood Education Program

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ABSTRACT

This study analyzed the academic performance and geographic disparities of students enrolled in the B.Ed. (Hons.) Early Childhood Care and Education program at the Virtual University of Pakistan. The objectives were to evaluate overall academic performance and credit completion, examine the relationship between cumulative grade point average (CGPA) and failed courses, and identify regional differences in performance. A quantitative, non-experimental design was employed using secondary data from all 83 students in the cohort, categorized by region: Punjab, Sindh, Small Towns, ICT, and Overseas. Academic performance was measured by CGPA, with failed courses and geographic location as independent variables. Descriptive and inferential analyses, including Pearson correlation and one-way ANOVA, were conducted. Findings indicated significant variation in academic performance across regions and a negative relationship between CGPA and failed courses, highlighting the impact of geographic and academic factors on outcomes. Targeted interventions in lower-performing regions are recommended to enhance overall achievement.

Keywords: Academic performance, CGPA, failed courses, geographic disparities, BEd ECCE

Introduction

Academic performance is a key metric of student success in higher education, reflecting both individual abilities and the quality of institutional provision (Ali et al., 2013; Khan et al., 2020). In online and distance learning programs, such as the B.Ed.

Online ISSN 3007-3197
Print ISSN 3007-3189
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(Hons.) Early Childhood Care and Education (ECCE) program at the Virtual University of Pakistan, students face challenges related to access to resources, learning conditions, and engagement with course content (Zamir & Wang, 2023; Hashmi et al., 2025). Geographic location has been identified as an important determinant of educational performance, as students in different regions may experience disparities in infrastructure, teaching quality, and socio-economic conditions (Tesema & Braeken, 2018; Adeel & Mustafa, 2023; Sajjad et al., 2022). Despite extensive research on student performance in higher education, few studies focus on regional differences in online teacher education programs in Pakistan. This study aims to evaluate academic performance and credit completion in the B.Ed. ECCE cohort, examine the relationship between cumulative grade point average (CGPA) and failed courses, and explore differences based on geographic location. Findings will inform institutional policies, targeted interventions, and strategies to improve online learning outcomes.

Objecives

- To evaluate the overall academic performance and credit completion rates of the B.Ed. (Hons.) ECCE
- To determine the relationship between students' Cumulative Grade Point Average (CGPA) and their number of failed courses
- To identify disparities in academic performance based on students' geographic location

Literature Review

One of the key indicators of student success is academic performance, which is based on personal abilities as well as the quality of institutions (Ali et al., 2013; Khan et al., 2020). In internet and distance learning courses, including the B.Ed. (Hons.) Early Childhood Care and Education (ECCE) program of the Virtual University of Pakistan, students' results depend on access to online resources, interactions with course content, and self-regulated learning competencies (Zamir & Wang, 2023; Hashmi et al., 2025). Such peculiarities make academic performance in virtual programs an important issue to understand, to inform strategies for enhancing learning outcomes and program effectiveness. Earlier studies have pointed out that

Online ISSN 3007-3197
Print ISSN 3007-3189

cumulative grade point averages (CGPA) are negatively influenced by the number of failed courses, which in turn affect overall academic progression and program completion rates (Malik et al., 2023; Nash, 2005). Students with poor performance in courses tend to show low overall academic achievement, indicating that monitoring course completion is necessary to identify at-risk students. The current research is consistent with this evidence, showing that CGPA and the number of failed courses are strongly negatively correlated, emphasizing the significance of early academic intervention for students facing difficulties. Geographic location has also been mentioned as having a major influence on academic outcomes. Learners in cities or well-equipped districts are usually among the top performers, compared to those in rural or under-resourced areas, due to disparities in educational facilities, socio-economic factors, and teaching quality (Tesema & Braeken, 2018; Careemdeen, 2023; Sajjad et al., 2022; Adeel & Mustafa, 2023). Regional inequalities in higher education in Pakistan are well-documented, although studies investigating these disparities in online teacher education programs remain scarce. It is therefore important to understand the effect of geographic factors on performance in virtual learning environments to provide equal educational opportunities. Although much has been written about academic performance and regional differences, there is a gap in studies that combine course completion, CGPA, and regional disparities within online teacher education cohorts in Pakistan. Most previous research focuses on traditional face-to-face programs, leaving limited knowledge about these factors in virtual learning contexts. This gap highlights the need for targeted interventions to support different groups of students. The current research addresses this by analyzing the B.Ed. (Hons.) ECCE cohort in terms of CGPA, failed courses, and regional differences, providing data on performance disparities, correlates of academic achievement, and possibilities for institutional intervention. The findings aim to support policy and practice by ensuring students across different regions have equitable learning opportunities and access to academic assistance.

Materials and Methods

This study employed a quantitative, non-experimental research design with a descriptive and correlational approach. Secondary data were obtained from the Virtual University's Virtual Information System (VIS). The population consisted of

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Volume 3, Issue 9 (2025)

Online ISSN 3007-3197
Print ISSN 3007-3189

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all students enrolled in the specified B.Ed. program, and a census sampling technique was used, including all 83 students in the cohort. Census sampling was selected because data for the entire population were available, ensuring complete representation and eliminating sampling error. The sample was categorized by region and city type as follows: Punjab Metros (n = 28), Sindh Metros (n = 19), Small Towns (n = 22), ICT (n = 9), and Overseas (n = 5). The dependent variable was academic performance, measured by CGPA, while independent variables included students' city and number of failed courses, with credits earned as a control variable. Data were anonymized to ensure confidentiality, and missing values were handled through exclusion or imputation. Statistical analyses were conducted using SPSS, R, or Python, including descriptive statistics (means, standard deviations, frequencies) and inferential analyses (Pearson correlation, t-tests, one-way ANOVA, and logistic regression) to examine relationships between variables and identify at-risk students. Ethical standards were strictly observed: personally identifiable information (PII) was anonymized, data were stored on a password-protected computer, findings were reported in aggregate form, and formal permission was obtained from the relevant authorities at the Virtual University. The methodology has certain limitations: being based on secondary data, it was limited to the variables available in the VIS, and important confounding factors such as prior academic background, socioeconomic status, internet connectivity, and personal circumstances were not available. Moreover, as a correlational study, it can identify relationships but cannot establish causation. Finally, the findings may be specific to this particular cohort and program and may not be generalizable to other universities or programs.

Results

Table 1: Descriptive Statistics for Academic Performance (N=83)

Variable	Mean	Std. Deviation	Median	Min	Max	Skewness
CGPA	2.07	1.03	2.25	0.00	3.42	-0.85
Credits	85.51	50.34	93.00	0.00	149.0	-0.62

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Variable	Mean	Std. Deviation	Median	Min	Max	Skewness
Earned					0	
Fail Courses	1.37	2.66	0.00	0.00	12.00	2.54

Descriptive statistics were computed for the key study variables. The mean CGPA of the cohort was 2.07 (SD = 1.03), with a median of 2.25, ranging from 0.00 to 3.42. The distribution of CGPA was negatively skewed (skewness = −0.85), indicating that more students scored above the mean. Students earned an average of 85.51 credits (SD = 50.34), with a median of 93, ranging from 0 to 149, and a slightly negative skew (skewness = −0.62). The mean number of failed courses was 1.37 (SD = 2.66), with a median of 0 and a range of 0 to 12, showing a positively skewed distribution (skewness = 2.54), indicating that most students failed few or no courses, while a small number of students failed multiple courses. These results highlight variability in academic performance and course completion within the cohort.

Overall, the cohort demonstrated above-average academic performance, with most students completing their courses successfully and only a few failing multiple courses.

Table 2: Pearson Correlation between CGPA and Failed Courses

Variable	1	2
1. CGPA	—	
2. FailCourses	-.923	—

Note: Correlation is significant at the p < .001 level (2-tailed).

A Pearson correlation analysis was conducted to examine the relationship between students' CGPA and the number of failed courses. The results indicated a strong, negative correlation between CGPA and failed courses (r = −0.923, p < .001),

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suggesting that as the number of failed courses increases, CGPA tends to decrease. The correlation was statistically significant at the 0.001 level (2-tailed), indicating a robust inverse relationship between these variables.

A strong, negative relationship was found between students' academic performance and the number of failed courses, indicating that higher numbers of failed courses are associated with lower academic achievement.

Table 3: Descriptive Statistics for CGPA by Geographic Region

Region	N	Mean CGPA	Std. Deviation	Std. Error
Punjab Metros	28	2.51	0.87	0.16
Sindh Metros	19	2.11	1.16	0.27
Small Towns	22	2.23	0.80	0.17
ICT	9	1.28	1.13	0.38
Overseas	5	1.66	1.15	0.51
Total	83	2.07	1.03	0.11

Descriptive statistics were computed to examine the distribution of CGPA across different regions. The mean CGPA was highest for students from Punjab Metros (M = 2.51, SD = 0.87) and lowest for students from ICT (M = 1.28, SD = 1.13). Students from Small Towns (M = 2.23, SD = 0.80) and Sindh Metros (M = 2.11, SD = 1.16) had intermediate mean CGPAs, while students from Overseas showed a mean CGPA of 1.66 (SD = 1.15). The overall mean CGPA for the cohort was 2.07 (SD = 1.03). Standard errors ranged from 0.11 to 0.51, indicating some variability in the precision of the regional means due to differing group sizes. These results suggest notable differences in academic performance across regions, with students from Punjab Metros performing relatively better compared to other regions.

Students' academic performance varied across regions, with some regions performing notably better than others, indicating regional differences in CGPA.

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Table 4: One-Way ANOVA Results for CGPA by Region

	Sum of Squares	df	Mean Square	F	p-value
Between Groups	16.18	4	4.04	4.39	.003
Within Groups	71.76	78	0.92		
Total	87.94	82			

A one-way ANOVA was conducted to examine whether students' mean CGPA differed across regions. The results indicated a statistically significant difference in CGPA between regions, $F(4, 78) = 4.39$, $p = .003$. The between-groups variability ($SS = 16.18$, $MS = 4.04$) was significantly greater than the within-groups variability ($SS = 71.76$, $MS = 0.92$), suggesting that region has a meaningful effect on students' academic performance. Post hoc tests would be required to identify which specific regions differ significantly from each other.

Analysis indicated significant differences in students' academic performance across regions, suggesting that region has a meaningful effect on CGPA.

Discussion

This study analyzed the academic performance of students enrolled in the B.Ed. (Hons.) Early Childhood Care and Education program at the Virtual University of Pakistan. Overall, students demonstrated satisfactory academic performance, with most completing their courses successfully. A small proportion of students failed multiple courses. The results show that students who fail more courses generally achieve lower overall grades. This highlights the importance of early academic interventions, such as remedial programs, counseling, and mentoring, to support students experiencing difficulties (Nash, 2005; Rovai & Downey, 2010; Malik et al., 2023). Geographic disparities were also observed, indicating that students' academic outcomes are influenced by their location. Students from well-resourced regions performed better than those from under-resourced regions, emphasizing the role of infrastructure, internet connectivity, and access to learning support (Tesema &

Online ISSN 3007-3197
Print ISSN 3007-3189
http://amresearchreview.com/index.php/Journal/about

Braeken, 2018; Careemdeen, 2023; Sajjad et al., 2022; Adeel & Mustafa, 2023). A strength of the study is the use of official academic records, providing an accurate assessment of student performance. Limitations include the small sample size and cross-sectional design, which restrict the ability to infer causation. Future research should consider longitudinal designs and qualitative approaches, such as student interviews, to gain deeper insights into the factors affecting academic outcomes (Hashmi et al., 2025; Nasir et al., 2025; Zamir & Wang, 2023).

Conclusion

The study examined differences in students' academic performance across regions. The analysis indicated significant variation in CGPA, suggesting that regional factors have a meaningful impact on academic outcomes. These findings highlight the need for targeted interventions and support in regions where students perform relatively lower, in order to enhance overall academic achievement. Future research could explore underlying factors, such as socioeconomic status or prior educational background, to better understand the sources of regional disparities.

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