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

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Abstract

The research examined the scholastic achievement and geographical gap among the students of the B.Ed. (Hons) Early Childhood Care and Education (ECCE) program in Virtual University of Pakistan. The research questions were: (1) to assess the general academic performance and credit completion, (2) to check the correlation between Cumulative Grade Point Average (CGPA) and courses failed, (3) to find differences in performance along geographic lines. The research design used was a quantitative non-experimental one based on the secondary academic information at the university Virtual Information System (VIS). The sample of the study was all the 83 students pursuing a particular cohort, and they were classified into five regions namely Punjab Metros, Sindh Metros, Small Towns, ICT (Islamabad Capital Territory), and Overseas. The analysis of data was performed with the help of descriptive statistics, Pearson correlation, and one-way ANOVA. The findings showed that, there was a significant negative correlation between CGPA and the failed courses ($r = -.923$, $p < .001$). One-way ANOVA showed that there were statistically significant differences in the mean CGPA by regions, $F(4, 78) = 4.39$, $p = .003$, with students in Punjab Metros doing the best and those in ICT doing the worst. Its results emphasize the essential role of the course failure on the overall achievement and the ongoing geographic disparities in outcomes of online learning. The paper suggests that at-risk students should receive specific academic interventions and policies be implemented to deal with the infrastructural and support-service differences across regions in order to facilitate educational equity in virtual teacher education.

Keywords: *Academic performance, CGPA, failed courses, geographic disparities, B. Ed ECCE*

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Introduction

In higher education academic performance is one of the key indicators of student achievement and institutional performance (Ali, Haider, Munir, Khan, and Ahmed, 2013). With the growth of online and distance learning that is now widespread in the world (as well as in Pakistan), it is important to determine the determinants of student outcomes (Zamir and Wang, 2023). Programs like the B.Ed. (Hons.) At the Virtual University of Pakistan, Early Childhood Care and Education (ECCE) provide essential access to teacher education but create special problems regarding access to technology, self-regulated learning, and engagement of the learners (Hashmi, Iqbal, Asghar, and Siming, 2025).

One of the factors with a well-documented impact on learning outcomes is the geographical location, and the latter is frequently linked to the difference in infrastructure, socioeconomic resources, and the quality of the educational support (Tesema & Braeken, 2018; Sajjad, Munir, Kanwal, and Naqvi, 2022). Within the context of online education, this can be translated into a digital divide, in which students with higher resources in urban settings (with better internet connectivity, less distracting study conditions, and a greater number of digital tools available) tend to experience more positive outcomes on online education than their counterparts in rural or less-developed areas (Adeel and Mustafa, 2023). Although the literature on the academic performance in conventional environments has a high volume of research, a gap exists in the literature on how these geographic and digital differences are manifested within particular online teacher education programs in Pakistan.

Thus, the research will bridge this gap by assessing the academic performance of a group of B.Ed. ECCE students. In particular, the research questions that it tries to address are as follows: What are the overall academic performance and credit completion rates of students in the B.Ed. (Hons.) ECCE program? Are there any significant differences in academic performance in relation to the location of the student? Are the numbers of failed courses related in any way to the Cumulative Grade Point Average (CGPA) of the students? Are the university administrators and policymakers likely to find evidence-based information to improve the results of all students regardless of their location? By implementing specific interventions, the relevant software will be used to allocate resources fairly and increase the support structure to improve the academic performance of all students, no matter where they are situated.

Objectives

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

Literature Review

The academic performance in tertiary learning is a complex construct that is developed as a result of interplay of individual, institution and environmental factors. Under traditional conditions, prior academic success, motivation, and the quality of teaching is one of the major predictors (Khan, Asif, Khan, and Azeem, 2020). Online learning is a new variable which comes with a set of other variables, such as, technological ability, access to a stable internet, and self-regulated learning (Hashmi et al., 2025; Rovai and Downey, 2010). In such settings, course completion and grade point average (CGPA) are the main quantitative performance measures.

One of the fundamental similarities in educational settings is the fact that failure in courses has a negative effect on the general academic development. The direct impact of failed courses is the reduction of CGPA and may demoralize students, which makes them more likely to quit (Nash, 2005).

Most recent studies in the online setting confirm this correlation, demonstrating that poor performance in particular modules is likely to be reflected in the overall performance of the students (Malik, Hassan, Rizwan, Mushtaque, Lak, and Hussain, 2023). It is therefore important that such academic difficulty is identified early enough in order to initiate intervention.

Geographic location becomes an important, but usually structural, factor in academic achievement. The Digital Divide theory offers an adequate perspective to the study (van Dijk, 2006). According to this theory, any unequal access to, use of, and the result of information and communication technologies (ICTs) contributes to the existing social and economic inequalities. The digital infrastructure, the width and availability of bandwidth, along with technical support and scholarly resources, are usually more favorable in metropolitan or developed areas of the educational setting (Careemdeen, 2023). On the other hand, small-town and remote student access and underdeveloped infrastructures are some of the obstacles that may prevent the regular engagement in online activities, on-time completion of assignments, and access to additional learning resources (Sajjad et al., 2022; Adeel and Mustafa, 2023). Pakistanis' studies have emphasized spatial disparities in the educational attainment (Sajjad et al., 2022), whereas not many have explicitly used this perspective to performance indicators in a homogenous online degree program.

Although there is an increased literature on online education, there is a distinct gap in the literature that combines the examination of the key indicators of academic achievement (CGPA, failed courses) with the geographic differences in the national context of virtual teacher education in Pakistan. The majority of related literature is qualitative, or in traditional universities, and investigates overall issues not connecting them to measurable results of performance. This research will fill this gap by utilizing a quantitative method to determine the relationship between geographic location, as a conceptualized around the digital divide, and academic performance within a specific online cohort.

Materials and Methods

Research Design

The research design utilized in this study was a quantitative, non-experimental with a descriptive and correlational study. The analysis of secondary data was carried out through the prevailing scholarly records.

Participants and Sampling

All students pursuing a particular group of B.Ed. (Hons.) were the study population. ECCE course in the Virtual University of Pakistan. The sampling method was a census one where all the 83 students who had complete data were considered meaning that sampling error was avoided. Geographic region was used to categorize the sample, i.e., Punjab Metros (n = 28), Sindh Metros (n = 19), Small Towns (n = 22), ICT (n = 9) and Overseas (n = 5). The sample sizes are small in the ICT and Overseas groups to depict the actual distribution of enrollment in the two regions. The secondary data was not always available in terms of demographic characteristics like gender and previous academic history which is noted to be a weakness.

Instrument and Data Source

The information was obtained out of the official Virtual Information System (VIS) of the university. VIS is an all-encompassing storehouse of student records in the field of academics, and it holds information on the courses enrolled, grades, credits obtained and student demographics. The essential variables that were extracted to be used in this study included: Cumulative Grade Point Average (CGPA), the number of courses that have been dropped, total credits obtained, and the geographic place.

Variables

Dependent Variable: Academic Performance which is operationally defined as CGPA (scale 0.00 to 4.00).

Independent Variables:

Factors of Failed Courses (count data).

Geographic Region all provinces of Pakistan.

Control Variable: Credits Earned (so as to control students who have travelled further into the program).

Data Analysis

Data cleaning, anonymizing and statistical analysis were conducted with the help of statistical software (SPSS). Analyses included:

Descriptive Statistics: Mean, standard deviations, median and range of CGPA, credits obtained and failed courses.

Inferential Statistics:

Correlation coefficient using Pearson to test the correlation between failed courses and CGPA.

Analysis of Variance (ANOVA) to determine whether there are significant differences in mean CGPA between the five geographical areas. The ANOVA was significant and post-hoc tests were meant to determine which specific differences between the groups were significant.

Ethical Considerations

The Virtual University of Pakistan administration gave the relevant permission to access anonymized, aggregate academic records. No personally identifiable information (PII) was applied when analyzing or reporting. Analysis and storage of data was done using a computer which had a password. The results are presented in the form of aggregates so that records of students are fully confidential.

Results

Table 1

Descriptive Statistics for Academic Performance (N=83)

Variable	Mean	Std. Deviation	Median	Minimum	Maximum	Skewness
CGPA	2.07	1.03	2.25	0.00	3.42	-0.85
Credits Earned	85.51	50.34	93.00	0.00	149.00	-0.62
Fail Course	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. Fail Courses	-.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 ($r = -0.923$, $p < .001$), 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.

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 paper involved the analysis of academic performance and its correlates in an online teacher education group in Pakistan. The discussion discusses the major findings with reference to the research objectives and the available literature.

First, the descriptive analysis showed that the average performance of the cohort was satisfying, but there was a high level of variation, especially in the number of failed courses. The prominent positive skewness of failed courses is indicative to the fact that most students go through the program without difficulties, although there is a small group of academically difficult individuals who drop out of several courses. This is in line with other researchers including Nash (2005) and Malik et al. (2023) who observed that a small proportion of the student population in distance education tend to constitute a non-proportional number of academic losses and failure.

Second, the very high negative correlation coefficient ($r = -.923$) between CGPA and failed courses is a very powerful confirmation of the intuitively operating and also documented association between course-level struggle and academic performance. This observation highlights how imperative early warning systems and proactive academic assistance as a form of tutoring, counseling or compulsory remedial classes to students who fail their first or second course is of paramount importance (Rovai and Downey, 2010). The fact that this correlation is also strong indicates that course failure is directly and mainly a driving factor of low CGPA in this online environment more than marginal performance in a multitude of courses.

Third, and the most notable contribution to this study was the large geographic performance difference. The results provide empirical evidence to the Digital Divide theory. Punjab Metros student, who would be enjoying enhanced infrastructural facilities generally and more institutional proximity to support services possibly, had the best mean CGPA. On the other hand, students studying ICT, another outcome that needs to be investigated further, and those abroad did the worst. Although the sample size of these groups is small and thus the numbers cannot be readily extrapolated, the high disparity between Punjab Metros and ICT is quite remarkable. Possible reasons why the performance of ICT is low may be the socioeconomic heterogeneity in the capital territory or certain local issues that were not reflected in this data. In the case of overseas students, those might include the differences in time zone, lack of access to Pakistan-focused support, or different educational backgrounds (Zamir and Wang, 2023). The results of the students in Small Towns were intermediate, as they were influenced by the mixed-resource environment theorized by the digital divide.

Limitations

There are several limitations that should be mentioned. The secondary data limited the analysis to the variables that were available thus disregarding important confounding factors such as socioeconomic status, academic background before, internet access quality and personal motivation. The cross-sectional design does not allow causal inferences. The region specific, and small and uneven sample sizes, especially of ICT and Overseas, restrict the statistical power and external validity of the geographic comparisons. The extremely high correlation between CGPA and failed courses, although statistically applicable, might be tautologous at least to some extent, since failed courses are one of the direct mathematical terms of calculating CGPA.

Conclusions and Recommendations.

The conclusions of this study are that academic performance in the investigated B.Ed. ECCE online group is intensely connected with course failures, but the performance differs significantly in geographic regions. This implies that individual academic recovery and intervention in structural inequities are two crucial directions that can be identified.

Practical Recommendations

To detect at-risk students and activate support mechanisms automatically (e.g., advisor contact, peer mentoring, supplemental instruction), the Virtual University should introduce an early alert system which will rely on first-course failure.

Establish and market regional-level support centers or specific online facilitators to students in under-achieving areas (e.g. ICT, small towns) to deal with local issues.

Policy Recommendations

The policy by the institution should promote and invest in infrastructure collaborations to enhance internet investments and set up physical study centers in the under-serviced areas.

To reduce the material dimension of the digital divide, the priorities of financial support and device-lending programs must be given to students representing underprivileged geographic areas.

Research Recommendations

Mixed-methods designs should also be used in future research, as quantitative information on performance will be complemented by qualitative interviews on the subjects of lived experiences and concrete issues that students experience in low-performing areas.

To determine the causal pathways, longitudinal studies of cohorts provide a solution to investigate the long-term effect of geographic differences on the graduation rates and teaching quality.

Theoretical Implications

This article confirms the usefulness of the Digital Divide theory to the study of educational performance in the Global South. It shows that geographic location is still a powerful structural variable even in the specifically designed virtual learning setting that is boundaryless, which implies that the theories of online education should explicitly address contextual and spatial aspects.

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