



ISSN 2278 – 0211 (Online)

Explanatory Factors for Academic Performance of University Students: A Mixed Method Approach

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Abstract:

The case under investigation was a private university which had recorded falling academic performances of their final year students over the years. The purpose of the study was to explain the factors that might have caused the trend. A mixed method approach, the type described as a sequential explanatory was used as a strategy to address the research questions. First a quantitative study, using a hierarchical multilevel regression analysis determined the contribution of the independent factors, which included a first test, to a second test which was the dependent factor, followed by a qualitative research based on a free-listing and a consequent focus interview. The results of the first study showed small impact of the first test on the second. Whilst school factors accounted for large explanation, that of school factors was small, necessitating the second study based on qualitative study on school factors. The implications for the outcomes are given under the appropriate section of the study.

Keywords: Academic performance factors, mixed methods of research, multilevel hierarchical regression analysis, universities, Ghana

1. Introduction

For university institutions, performance is very crucial. Good performance record makes a good advertisement whilst a bad one makes a poor advertisement. Especially in Ghana where the number of tertiary institutions is on the increase, a university must be concerned about a consistently poor performance. The private university in the case (the research protocol disallows disclosure of the name of the university) had been recording falling rates in the grade point of the students for the past three years. The authorities were therefore concerned that this trend, if left unattended to may result in a fall in the number of students' intake, given the competitive nature of the market. Research of this nature in the context of a private university was infrequent. And so management had not much information to learn from. The consensus amongst the authorities therefore was that the problem needed a methodical investigation to unearth the solution. This was the problem statement of the study.

2. Research Questions

The nature of the problem justified the adoption of a mixed method approach (this approach is touted as the best in knocking off limitations of each of the other singular approaches) to find answers to the following research questions:

- What factors explain students' academic performances?
- What qualitative reasons give evidence to these relationships?

The remaining part of the study are in the order of; literature review of factors that affect students' academic performance, the research methodology, the results, discussion of the results and finally the conclusions.

3. Literature Review of Factors that Affect Students' Performance

The purpose of a literature review is to delimit the research problem, seek new lines of inquiry, avoid fruitless approaches, gain methodological insights, and identify recommendations for further research as posited by Gall, Borg, and Gall (1996) and also discover important variables relevant to the topic, identify the main methodologies and research techniques that have been used, as posited by Hart (1998). In selecting the items for the review we picked those commonly cited factors that contributed to students' performance. By doing so we discovered and concentrated on those important variables that were relevant to the topic. After a thorough review of the articles the researchers settled on the research works on the relationship between 1st tests and 2nd tests, students' background factors, school factors and teaching quality factors as independent variables and academic performance. as dependent variables.

3.1. First Test of Examinations and Effect on Subsequent Tests

First university examinations commonly known as FUE are a typical example of 1st test that are administered for the purpose of making selection for admission. Even for non-educational institutions there is always an entry test which is used as a standard for screening the best materials out of the lot. Geiser and Santelices (2007) found that high school grade point average is time and again the best predictor of college grades. Benjamin and Fuss (1994) as cited by Koshaba (2005) supported the views and found proof to suggest that high school grades were without uncertainty the best predictors of academic performance. Waller and Foy (1987) carried out an investigative study of British school examinations as a predictor of university performance in pharmacy and stated in their conclusion, that pre-university performance is significantly correlated with undergraduate performance.

3.2. Students Background Factors that Affect Performance

Most works in this area showed gender, family size of parents of students, the social economic status of parents, parent's level of education and parent's level of involvement and participation in school activities as determinants of school performance. Woodfield and Earl-Novell (2006) established that female students do better than male students and credited this partly to female students being more reliable and thus less likely to miss lectures. However, Haist, Wilson, Elam, Blue, and Fosson, (2000) had an opposing view and showed that men perform better than women in certain settings while women do better than men in other areas.

Still on background factors, Kulpoo (1998) found that in many less developed countries, education in rural areas is often synonymous with a poor context for learning. Stricker and Rock (1995) conducted an analysis by assessing the impact of the pupils' initial characteristics (gender, ethnicity, parental education, geographic region and age) on academic performance. They found that the students' initial characteristics have a modest impact on their academic performance and among them parental education is the most significant.

3.3. School Factors that Affect Student Performance

Chimombe (2011) attested that school environment that is not conducive for learning may lead to under performance. In the view of Lumuli (2009) providing adequate learning facilities at all levels, including equipment and human resources enhances the quality and relevance of imparted skills of learners. Rok (1995) identified textbook ratio and school facilities as some yard sticks to be used to gauge the quality of secondary school education. Physical materials in terms of sufficiency and value have been noted to have a great impact on performance of students in the examination by Husen, Saha, and Noonan, (1978). In the views of Eshiwani, (1993) where school fees are inadequate, the state of infrastructure will be poorly developed, compromising content delivery. This ends up putting a lot of strain on existing resources which end up compromising academic performance of the school. Scheerens and Bosker (1997) contend that an average school will explain about 19% of the variance in student academic achievement without partialing out of other variables. Kyriakides and Luyten (2006) found a consistent result that school-level predictors accounted for 50% of the variance in the cognitive growth of students. Other factors commonly identified in the literature included Teacher-pupil ratio, School environmental conditions and Class room conditions. For the purpose of this article, school factors are those conditions, events, the general atmosphere, school functions and other factors apart from teacher quality factors that are under the control of the management of the school.

3.4. Teacher Quality Factors

Snehi, (2011) found that Teacher quality was an important factor affecting student performance. This position was corroborated by Becket and Brookes (2008) who added that there was an urgent issue for both instructors and researchers to think about how to maintain teaching quality to enable students to attain learning objectives and elevated learning performance. Barr and Tagg (1995) emphasized on the effective and efficient use of teaching methods, curriculum, and materials of teachers. Ander and Burns (1990) views were based on teacher-student relationship. They urged teachers to interact and communicate with their students in such way that will change students' learning behavior. Astin (1993) stressed that interaction must not only involve students and their lecturers but also students' peers and even other members of the faculty in discussing issues based on intellectually meaningful subjects. Shea, Frederickson, Pickett, Pelz, and Swan, (2013) supported the views that students who reported the highest levels of learning and satisfaction also reported the highest levels and quality of interaction with the instructor and with other students. This position was corroborated by Kyriakides, Campbell and Christofidou (2002). Dewar (2002) who described good teachers as those who showed empathy, are accessible and made good presentations during class room sessions. In the views of Stuck and Coop (1987) good teaching involves management of instructional time, management of student behavior, instructional presentation, instructional

monitoring, and feedback. Harb and El-Shaarawi, (2006) took a position that when teachers match the learning styles of students with that of their teaching style, there is always a positive effect of performance.

There is a match between students' learning preferences and teaching style. Mlambo (2011) cited Neil Flemming (2001-2011) as having identified the learning preferences of students as follows:

- Visual learners: students who prefer information to be presented on the whiteboard, flip charts, walls, graphics, pictures, color. Probably creative and may use different colors and diagrams in their notebooks.
- Aural (or oral)/auditory learners: students who prefer to sit back and listen. Do not make a lot of notes. They may find it useful to record lectures, for later playbacks and reference.
- Read/write learners: Students prefer to read the information themselves and take a lot of notes. These learners benefit from given access to additional relevant information through handouts and guided readings.
- Kinesthetic (or tactile) learners: these learners cannot sit still for long and like to fiddle with things. Prefer to be actively involved in their learning and thus would benefit from active learning strategies in class
- A teacher's knowledge and application of these students' preferences can affect a student's performance.

3.5. Teacher Quality, Attendance at Class and Performance

Newman-Ford, Lloyd & Thomas, (2009) identified assessment pressures, poor delivery of lectures, timing of lectures, and work commitments as major reasons given by students for non-attendance. A habitual non-attende student is likely to score poorly as compared to a frequent attendee.

4. Methodology

4.1. Research Design

The research design was based on a mixed methods strategy described by Creswell (2003, p 215) as a sequential explanatory design. In such designs priorities are given to the quantitative element, whilst using the qualitative element as support. Such designs may or may not have a specific theoretical perspective (Creswell 2003, p 215). We chose the latter. Thus though we did some literature review, we did not use the mode of hypothesis testing. We reviewed the commonly cited factors that impacted on students' performances and used them in the quantitative study. The quantitative study was based on a multi-level modeling. Multilevel modelling (MLM) is in many ways very similar to multiple regression, in that it is also used to look at the relationship between a dependent variable and one or (usually) more predictor variables (Muljs,2004 p,202). However, the two differ based on statistical and substantive reasons (Muijs,2004). Whilst multiple regression normally uses the techniques of random sampling, multi-level modelling uses a hierarchical or cluster sampling. It is commonly used in educational research. With this approach the researcher is allowed to look at how much of the variance in pupils' achievement is explained at the individual level, how much at the classroom level and how much at the school level, for example (Muijs, 2004, p 205). The results of the quantitative study (which showed contributory factors to school performance) dictated the direction of the qualitative study. Thus, the qualitative study was used as a means to consolidate the findings of the quantitative study. Sequentially, we conducted a qualitative study, involving two exercises; namely a free-listing exercise initially, followed by a focus study. In this way, the design was a mixed Method based on two of the reasons for the use of a mixed method approach: supplemental and triangulation by Bryman (2006)

4.2. Participants

The participants were all the second year students in the university as at the time of doing the research. Thus they constituted homogenous set of samples which presumably shared similar characteristics. The advantage of a homogenous group study is that, because they share similar characteristics, it enables the researcher to study them in great depth (Saunders et al, 2008, p. 240). They numbered 135 (M: 79.F:56). All the students had taken part in both 1st and 2nd tests. The 1st test took place during the 1st semester whilst the 2nd test took place during the last semester, spanning a period of nine months.

4.3. Data Collection

The data collection was sequential. First, within the quantitative method, the students were made to take a 1st tests. The test was moderated by experts in the field. After that, data relating to the students' background, teacher quality factors and school factors were taken. Whilst background of students was nominal and some ordinal, such as gender, age, level of education, income level, marital status, level of parents' education, religion, and ethnic background, parents' level of income, their occupational status, their level of education, and the personal possessions in the home, data based on teacher and school factors were constructed on the participants score of 1-5 of "strongly disagree", "disagree", "neutral", "agree" and "strongly agree" in that order, on items under those variables. For the teaching quality statements, 15 statements were listed whilst for school factors 18 statements were listed. The items on the scales were adapted from the works done by Maria Siniscalco and Nadia Auriat for UNESCO in the series *Quantitative Research Methods in Educational Planning* (2014). The support for the scales is without any doubt. The end part of the quantitative data collection was a second test, based on the same contents administered to the same set of students. The results of the quantitative method were used in dictating the focus of study in the qualitative study. The first data collection under the qualitative study was based on the exercise called "free listing". In that exercise all the participants were asked in a survey to list the factors that affect

students' academic performance. The questionnaires were analyzed to establish the major factors, which were the concern of management of the university. These factors were further investigated through a focus study of a random sample of the participants. Investigative questions for the focus study assumed the format, as below:

- What are the school inhibiting factors to your academic performance?
- How do the factors affect your academic performance? Please, explain.
- How often do the actions or events occur?
- How do you manage the situations?

The other data which supplemented this qualitative study were secondary data taken from the records of the university.

4.4. Data Analysis

4.4.1. Quantitative Analysis

Data analysis was also sequential. The quantitative study was analyzed through a multilevel statistical analysis program, SAS. SAS (Statistical Analysis Systems) is a software suite developed by SAS Institute for advanced analytics, multivariate analyses, business intelligence, data management, and predictive analytics (Wikipedia, the free encyclopedia, 2016). The independent variable was the results of the 1st test whilst the dependent variable was the results of the 2nd test. The 'co-relates' were students background factors (control variables), school factors and teaching quality factors. When entering the data into the regression model, we entered the results of the 2nd test, followed by the results of the 1st test. After getting the bivariate correlation results from this, we sought to get an explanation for the effects of background factors, the school factors, and teaching quality, in that order using multi-level analysis. The software made a provision for the unexplained variance in the bivariate score between the first and second tests. Thus the second level was to analyze the percentage of contribution of the other factors to the unexplained variance. All the assumptions based on multiple regressions were respected before the analysis. Sample size requirements, based on the formula $N > 50 + m$ were met as stipulated by Tabachnick et al (2007).

4.4.2. Qualitative Analysis

The result of the quantitative study dictated the nature of data collection for the qualitative study. The concentration was on the factors (shown under the multi-level model) which were supposed to be the least for the unexplained variance of the results of the quantitative study. The deduction was that the least predictors needed some investigation in order to improve their contribution to academic performance. This was followed by the qualitative research. First, through a "free listing" exercise, all the participants were asked to list the inhibiting factors to their academic performance. The results were analyzed which then formed the basis of a follow-up focus interview. The focus interview was analyzed through a general inductive system (Thomas, 2006) which identified categories of factors that affected academic performance. In doing the analysis we followed the principles (albeit adapted) as stipulated by Thomas (2006) below:

- We were guided by the research objectives investigative questions, which identified domains and topics to be investigated.
- We carried out a thorough multiple readings and interpretations of the raw data gathered from the "Free listing" exercise.
- The first set of code was determined by one of the researchers, followed by that of another.
- We then compared and agreed on the reliability of the codes. We then developed categories from the raw data into a framework which was used for the focus study.
- We followed the same principles for the focus study.

4.4.3. Validation Issues for Quantitative Study

As part of ensuring validity of the study, the internal consistency of the scales was tested: Whilst the internal consistency of the teaching quality scale was .7 that of school factors was .8. The scales used had proven record of support. The 1st and 2nd tests were validated by three members of the faculty who were tasked by management to, for the most part, determine the adequacy of the two tests for the class of students.

4.4.4. Validation Issues for the Qualitative Study

The major approach in ensuring the validation of the qualitative data was 'member checking'. In this approach we involved the students in the analysis of the 'free listing' and focus group interviews. Thus in the results section, some significant statements made by the students are captured.

5. Results

Under results, we report that of the quantitative study followed by the qualitative study.

5.1. Quantitative Study Results

The results of the multi-model are shown under Table 1. as below.

Variable	Coefficients	% of Variance to be explained
Constant	16.6 (1.8)	
1 st test score	.29 (0.4)	
Level		
School	5.8(1.6)	5.5 %
Teacher quality	99.1(7.3)	94.5%

Table 1: Multi level model
2nd test scores predicted by 1st test scores

5.2. Interpretation of Results

The results of the quantitative study indicated that, after taking into account teacher quality factors and school factors (and after controlling for background factors), if the student score had improved by 1 in the 1st test score, the second score would have improved by .29 which by Cohen's (1998) standard is small, and so confirming school management anxiety about students' performance. All the results were significant showing a coefficient which was more than 50 % of that of their standard errors, by the rule of the thumb in statistics. However, school factors appeared to contribute the least (6 % of variance to be explained, as seen in table 1) to students' 2nd test results. This then formed the basis for the second part of the study, the qualitative research.

5.3. Qualitative Results

Under this we show for each factor the significant statement culled from the focus interview notes. This is in line with the qualitative researcher's ontological philosophical assumptions. All the factors presented here were based on school factors.

5.4. Classroom Factors

Classroom factors related to the conditions in class during class sessions. It did not include teacher factors. The significant statements were as follows:

- "Some of the students have the habit of entering the classroom late in the middle of the class session. There appears to be no policy to control this. For it disrupt the class progress"
- "This group of nationals wear very pungent perfumes. The fragrance is all over the class and I think this is an interruption in class"
- "The noise from the generator set is deafening. The authorities must do something about this"
- "Is it possible to change the old furniture to new? Some of the seats are uncomfortable"
- "The lecture period for me should be partitioned. The three hours for a session could be partitioned to one and half for different days or times. For me teaching is most effective within the one and half hour period"

5.5. The School Canteen

"There is no variety in the stuff. Some of us are therefore forced to go outside campus to buy and this takes away some of the time for learning. And this is happening a lot of the time"

5.6. "Dull "and Bushy Atmosphere

- "The policy on entertainment has to change. Being a Christian does not bar you from socializing. Campus here is dull"
- "The policy of girls only and boys only hostel is anti-social"
- "Sometimes the campus is bushy making some of us fear to go out of the hostels to the classrooms to study, especially during the night. Sometime hostels environment is not congenial for learning and this affects student performance. I have to be indoors to study"
- "There nothing interesting happening in terms of socialization. Sometime one needs to release tension. Thus we are forced to go outside to socialize, taking some of our time"

6. Discussion of Results

Under this section we discuss the theoretical and practical implications

6.1. Theoretical Implications

6.1.1. School Factors, Teaching Quality and Student Performance Relationship

The results of the quantitative study had been supported by a number of authors. Whilst Liu and Jung (1980) found that student satisfaction and grades are correlated, Pike (1991) examined that satisfaction influenced grades and found a positive result. Students who reported the highest levels of learning and satisfaction also reported the highest levels and quality of interaction with the instructor and with other students (Shea, Fredericken, Pickett, Pelz, and Swan, 2013). Similarly, in our case, learning satisfaction was the extent to which students were satisfied with the school and teaching quality factors. Whilst teaching quality had contributed far

more than school factors, the results of the evaluation exercise involving the use of a first and second test showed little impact on each other.

6.1.2. Methodological Triangulation

Triangulation takes many forms (Bryman 2006). In our case we did the triangulation based on philosophical assumptions of pragmatism. Saunders et al (2009 p 109) took the position that quantitative and qualitative studies are possible and highly appropriate within one study. They also cited Tashakkori and Teddlie (1998) as suggesting that it is more appropriate for a researcher in a particular study to think of the philosophy adopted as a continuum rather than opposite positions. The way we framed our research questions was in line with this position. The qualitative research question was framed in such a way that it was a follow-up to the quantitative study. There might have been similar approaches by other authors. However, it is our view that our arrangement is unique for the kind of context of the case.

6.1.3. Originality of Study

Though a lot of work had been done based on the concepts used in the study, this study was original based on the fact that it used a combination of the two methodological approach spiced with in vivo (original) quotations from participants in a unique circumstance.

6.2. Practical Suggestions

6.2.1. University Authorities

The results are very enlightening especially for the university in the case study and for other authorities. The impact of the tests on each other was small with school factors contributing a small part of the impact. Urgent measures to improve upon the school factors are suggested below:

- The authorities should immediately tackle problems identified from such research relating to school factors and do a continuous assessment of the situation.
- They could learn from other universities on how to manage the physical and social resources in the school that influence academic performance of the students.
- Involve parents in the management of school and social resources.
- If possible, allow the school representative councils (SRC) to take over the canteen facilities. They might be in a better position to manage the canteen factors. Whilst serving as a motivating factor, this arrangement could bring financial benefits to the SRC.
- Create a counseling unit for students in a bid to eliminate any cultural differences that may be inhibiting academic progress.

7. Conclusions

The research on factors that explain students' academic performance is very crucial for universities. We used a mixed method in the study in order to benefit from the full advantages of the two approaches. The results had been corroborated by some other works. The study though has some limitations. The volume of the participant's statement based on the qualitative findings was not sufficient, in our opinion. Our explanation is that we were constrained by the number of words as dictated by the journal submission guidelines. We however assure that that it did not have any significant impact on the whole study as those quotes given here are really representative of the population of students studied.

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