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THE UNSUITABILITY OF ENTRY REQUIREMENTS AS PREDICTORS FOR SUCCESS IN ARCHITECTURAL DESIGN COURSES: A CASE STUDY OF CHUKWUEMEKA ODUMEGWU OJUKWU UNIVERSITY

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Abstract

Stakeholders in architectural education have observed a decline in performance in architectural design courses and ascribed this trend to a drop in quality of candidates admitted into the programs being offered. The apparent solution would therefore be to seek to reverse the perceived deterioration in quality of entry candidates for the architecture program. This study, however, sought to investigate the relationship between students' performance at entry and their performance in architectural design courses. The Department of Architecture, Chukwuemeka Odumegwu Ojukwu University was used as a case study. The study was aimed at determining whether the quality of performance at entry was sufficient to predict performance subsequently and hence proffer empirical guidance for seeking solutions to the observed problem. Historical design approach was adopted. Data was obtained from departmental records of students. The entry performance statistic used was the scores obtained in the Senior Secondary School Certificate Exam, while that used for performance in design was the aggregate score of results obtained in design courses offered in the program. It was found that differences in entry scores didn't always translate into corresponding differences in design performance; hence it was flawed to use entry performance as sole basis for predicting performance of students in Design courses. It is recommended that a multi-factorial approach to investigating academic success be adopted for best results and that institutions should construct coherent policies that enable all sections of the institution to collaboratively create the conditions that will aid all students to succeed, irrespective of the attributes or capacities they enrol with.

Keywords: academic success, architectural design, entry requirements, performance predictors

INTRODUCTION

The problems of persistence (towards completion) and academic success amongst students who enrolled in tertiary education have attracted the attention of stakeholders over time. This has also been followed by a documented feedback, from employers of labour in Nigeria, of poor performance (by graduates of higher education) in the skills they were supposed to have acquired during the process (Okebukola, 2006; Pitan & Adedeji, 2012; Muoghalu, 2014). Furthermore, a decline in academic performance of students in tertiary education programs has been noted in literature (Opoko, Oluwatayo, & Ezema, 2016; Eze, 2015). The deterioration in performance of students in Architectural Design juries, in particular, has equally been identified as a worrisome trend (Ebong & Atemewan, 2014).

Amongst the reasons offered for this observed trend in tertiary education in Nigeria, is the concurrent perception of poor performance in entry requirements submitted by students entering the architecture programs offered by institutions (Adewale, 2014). Eze (2015), while giving causes for the perceived decline, alludes to the practice of admitting students who are not properly qualified and suited for the architecture program. Though unfit, these students were, however, allowed to proceed through the program with attendant poor outcomes.

A sampling of curriculum content of architecture programs in tertiary institutions in Nigeria, shows that the course area that has the highest credit load and hence is allocated the greatest amount of time, manpower and resources (when compared with other course areas) is Architectural Design (ABSU, 2007; ANSU, 2012; CRC, 2011; University of Jos, 2015). This observation can be explained intuitively because design is at the heart of architectural practice and all other knowledge areas the student engages in, feed into it. This importance of the design course is further illustrated by the fact that design courses are undertaken at every level of the programme. Even at the first year, where it may not exist as a course, subsidiary courses with introductory design content are taught. It is noteworthy, also, that in the Architecture program, failure of a Design course implies repetition of a year's work for the student. From the foregoing, it can be inferred that performance in the design course can be used as an indicator of the likely overall performance of a student.

The design course is often examined by jury method which involves the empanelling of assessors to examine students who present their works to them. This is usually done at all levels of the knowledge area and is particularly of great interest for all concerned at the graduating levels. In the university, these graduating levels are the various bachelor's degree exams and master's degree exams. In the polytechnics, these are the ordinary national diploma and higher national diploma examinations.

Notwithstanding the observations about a general decline in performance of students at the required exams, the rules on entry requirements into higher institutions in Nigeria generally and the architecture programmes in particular, have remained the same. It can therefore, be safely assumed that the majority of students who enrolled for these programmes met the entry requirements stipulated by their institutions and regulating bodies. Nonetheless, though all admitted students assumedly met minimum entry requirements, it is pertinent to query whether (i) there is indeed a trend of decline in performance as stated and (ii) whether differences in performance in the qualifying exams did result in related differences in performance in the architecture programme. Resolving these will aid the clarification of the relevance of the use of entry requirements as indicators for post-entry performance. It will also serve to contribute to empirical guidance for seeking solutions to the observed problem of poor performance in Architectural Design courses. This study is therefore aimed at investigating the relationship between entry requirements and performance in the architectural design courses of students of the Department of Architecture, Chukwuemeka Odumegwu Ojukwu University (COOU) with a view to proffering empirical guidance for reversing the perceived decline in performance in Architectural Design. It specifically sought to:

i. Determine whether there were any differences in performance in SSCE and Architectural design, amongst students who enrolled into the architecture programme (2009-2013).
ii. Investigate if the performance in required SSCE subjects for the architecture programme were a valid predictor for performance in Architectural design courses for the class groups 2009-2013.

The guiding hypotheses were that

i. there is no significant difference in composite scores for SSCE and Design scores of students of Architecture in COOU from 2009-2013.
ii. there is no significant relationship between SSCE scores and Design scores amongst students of Architecture in COOU from 2009-2013.

The study was delimited to students of the Department of Architecture, Chukwuemeka Odumegwu Ojukwu University (COOU), Uli campus, Anambra State, Nigeria.

LITERATURE REVIEW

Tinto and Pusser's preliminary model of institutional action

This is a model for institutional action towards encouraging more students attending tertiary institutions to persist (stay in school) and succeed (finish their programs after acquiring required knowledge). It was proposed by Vincent Tinto and Brian Pusser in 2006. While acknowledging the theoretical contributions of researchers on the issues of persistence and success in tertiary education, they posited that there was insufficient actionable guidance for institutions to implement structures that would yield better performance. This was based on the understanding that institutions should form a major front for tackling these problems since it was within and around them that the activities involved in persistence and successful learning occurred.

The model asserted that:

i. Students enter an institution with a variety of attributes, abilities, skills, and levels of prior academic preparation, attitudes, values, and knowledge about higher education
ii. Students, at the same time, participate in a range of external settings each of which has its own demands on students' time and energies
iii. Students, enter institutions with specific attributes and resources
iv. Student and institutional attributes, within the timeframe for institutional action, are fixed and therefore not immediate objects of institutional action
v. However the following are not fixed, hence are amenable to institutional action: institutional commitments, the expectational climate established by members of the institution, the academic, social, and financial supports provided by the institution, the feedback that is provided to and about students by the institution, and the educational and social activities that shape student academic and social involvements and/or engagements within the classroom and with other members of the campus (Tinto & Pusser, 2006). See Figure 1

The model then argues that

i. Institutional commitments provide the overarching context for institutional action
ii. Everything else being equal, institutions that are more committed to student success are more likely to generate success than institutions who are not
iii. Institution's commitment to student success sets the tone for the climate of expectation for success that students encounter in their everyday interactions with it, its policies and practices, faculty, staff, administrators, and other students.
iv. The good encounters in the institution influence the quality of student effort and student learning and both in turn shape student success, particularly in the classroom. This success in classes leads to eventual degree completion.

v. Student success is most likely to occur when all these right conditions exist.

vi. Institutional policy must be coherently constructed to enable all sectors of the institution to collaboratively construct those conditions for all students on campus (Tinto & Pusser, 2006). See Figure 1.

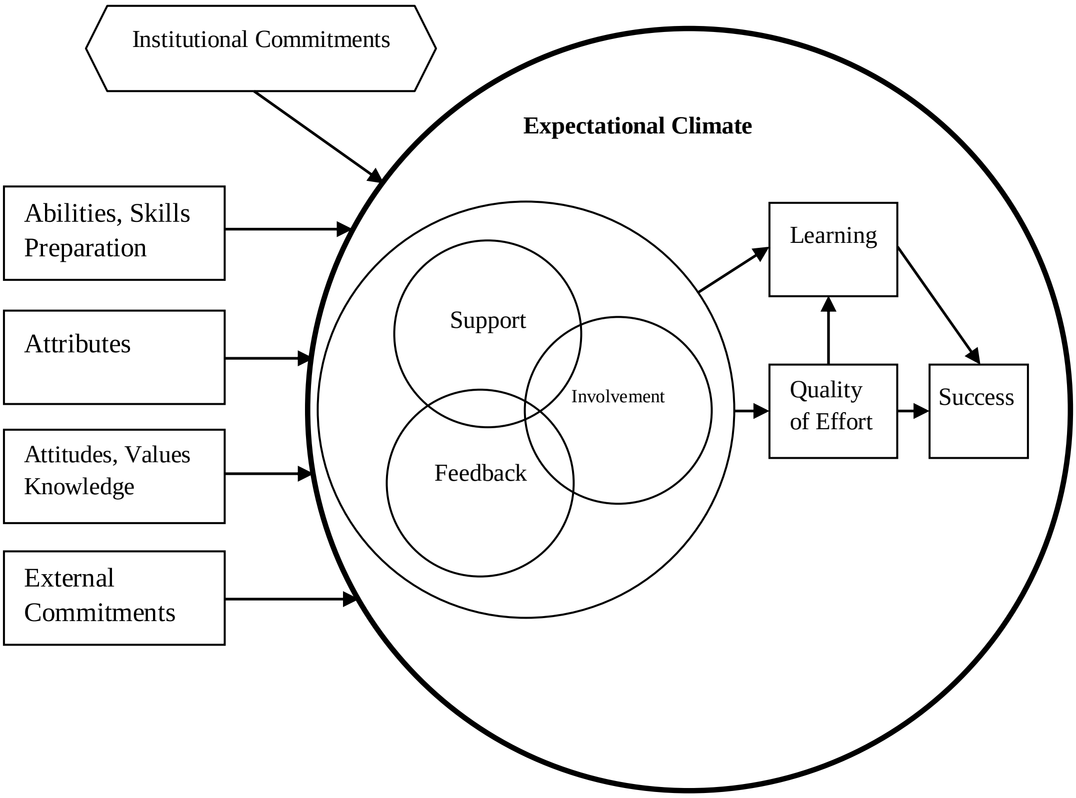

Figure 1: Tinto-Pusser Structure of a preliminary model of institutional action

Source: (Tinto & Pusser, 2006)

This model is relevant to this study because the issues of validity of entry requirements and success in courses are institution based concerns. The quest for the resolution of the issues raised will provide further guidance for institutional action and response to decline in completion rates and poor performance in courses offered. The emphasis on the need for institutions to adopt a holistic approach to successful learning by creating a suitable atmosphere for students is an underlying basis for this study. An entry requirement is simply a measure of prior academic preparation, one amongst many variables likely to contribute to success; hence this model provides a framework for understanding its relative importance amongst the determinants of academic success in tertiary education.

Review of Empirical literature

Several studies have shown evidence that academic entry requirements are valid predictors of successful performance of students in tertiary institutions (Kukwi & Amuche, 2014; Naidoo, Motala, & Joubert, 2013; Awoniyi & Awoniyi, 2014). Others showed evidence to the contrary (Faleye, 2015). In a study, for example, entry requirements were shown to have a relationship with students' performance in science courses, in situations where different entry requirements were applied for different groups of students, who offered the same physics course (Zezekwa & Mudavanhu, 2011). Those with stricter science-based entry requirements performed better than those who didn't. In another study, also on science students with different entry backgrounds offering a physics course together, the results were different (Wambugu & Emeke, 2013). For the architecture programme, the results have also varied. Whereas Aluko, Adenuga, Kukoyi, Solingbe, and Oyedeji (2016) reported success in validity tests using machine learning techniques, Opoko, Alagbe, Aderonmu, Ezema, and Oluwatayo (2017) reported that entry requirements were not valid predictors for performance.

Though it found indications that matriculation scores were indeed a good predictor of degree averages, Naidoo, Motala and Joubert (2013) also pointed out that, while there appears to be some evidence indicating that pre-enrolment scores are a valid predictor of academic success, evidence also existed that this was not always true. Fraser and Killen (2003), Awoniyi and Awoniyi (2014) and Faleye (2015) agreed that there is the underlying assumption by the admitting institutions that students who met entry requirements for admissions or had above-average matriculation scores would succeed in their respective chosen courses of study. Wambugu and Emeke (2013) averred that this was premised on the belief that learning is a cumulative process; hence present learning was predicated on success in the previous ones. It is noteworthy, however, that the particular set of entry requirements or entrance exam scores researchers chose to use as predictors and the criteria used for determining successful performance affected the results of their study (Faleye, 2015).

Consequently, Naidoo, Motala and Joubert (2013) and Killen (2002) opined that the level of importance placed on entry-level academic performance was defective because academic aptitude is only one factor, amongst several, which contribute to students' success in their studies. Indeed, Mlambu (2011) averred that the combination of factors influencing academic performance varies from one academic environment to another, one set of students to another, and from one culture to another. It listed several factors from literature, apart from entry qualifications, identified by researchers as affecting academic performance to include class attendance (Romer, 1993), self-motivation, age of student, learning preferences (Aripin, Mahmood, Rohaizad, Yeop, & Anuar, 2008), parents' education, family income (Devadoss & Foltz, 1996), students' efforts, and previous schooling (Siegfried & Fels, 1979; Anderson & Benjamin , 1994) (Mlambu, 2011). These, ought to be brought into calculation for a full explanation of any particular individual's success or failure to be given. The need for institution based mechanisms to identify and support students with weaker educational backgrounds were also identified (Zezekwa & Mudavanhu, 2011).

Aside from adding to growing empirical evidence, this study was necessitated because, as literature showed, most studies were based on single data sets of students, thus approaching the issue from a cross-sectional perspective. This study applied a longitudinal research design on the same locale. Evaluating data at intervals of time provides the opportunity to test the consistency of conclusions. Also widening the locale of study for the identified problems increases the strength or otherwise of accepted conclusions.

METHODOLOGY

A longitudinal design approach was adopted. Data was obtained from departmental records of results of students. The sets of students who enrolled from 2009 to 2013 constituted the population for the study. The use of a combination of data sets from 5 different successive classes was to increase the base of study and perhaps establish a pattern of behaviour. Data sets were analysed using Pearson's product moment correlation analysis tool and the Analysis of variance (ANOVA) tool. The particular entry statistic described consisted of the scores obtained in the West African Examination Council, Senior Secondary School Certificate Exam (WAEC-SSCE) or its equivalent. The requirement for entry into the architecture programme is possession of a minimum of 5 credit passes in 3 compulsory subjects: English Language, Mathematics, Physics and any other two from a list which includes Biology, Chemistry, Economics, Geography, Fine Arts and Technical Drawing. The five scores collected for each student were that for the three compulsory subjects and the best two from other subjects.

The statistics described for performance in design were the scores obtained in the five Architectural design courses offered throughout the duration of the undergraduate programme. These were ARC 211, ARC 212, ARC 311, ARC 411 and ARC 412. Additionally, a composite score variable for Architectural design was obtained during analysis. This involved an aggregation of all design courses as one variable. Similarly, a composite score for entry requirement courses was obtained, thus enabling the treatment of these scores as one variable whose relationship with another could be investigated. Also a unified number coding system was used for score categories in both exams i.e. A=5, B=4, C=3, D=2, E=1, F=0. This is the cumulative point scoring system used in the university system. The scoring system used in entry qualification exams is similar in its use of alphabets. It, however, has multiple points under different alphabets (A1, B2, B3, C4, C5, C6, D7, E8, F9). All grades bearing the same alphabet were therefore placed in the same category and given the same score e.g. B2 and B3 were categorized as B and scored 4; C4, C5, and C6 were categorized as C and scored 3.

All students who enrolled into the architecture programme from 2009 to 2013, and who completed it, were included in the population for the study. The need for records of students who completed the programme was to ensure that they had been examined in all design courses offered since these results were required. These records involved 5 streams of students. In the process of data gathering, any student whose relevant records were not complete in the archives of the department was removed from the pool. Following this, a total of 113 students in the data sets were involved in the study. They were distributed by year of enrolment as shown in Table 1.

Table 1: Number of students in the study population according to year of enrolment

S/n	YEAR OF ENROLMENT	NUMBER OF STUDENTS WITH COMPLETE DATA
1	2009	23
2	2010	19
3	2011	10
4	2012	36
5	2013	25
	TOTAL	**113**

Source: Fieldwork, 2018

RESULTS

Significant difference between the class groups in the SSCE and Design scores

As seen in Table 2, the result of the one-way ANOVA test for these variables indicates that whereas there was a statistically significant difference (0.001) in average scores between the different class groups in grades obtained in the SSCE exams, there was no such commensurate difference in the average scores obtained for design. Hypothesis 1 is therefore partially upheld. It is found untrue for SSCE scores, but true for Design scores.

Table 2: One-way ANOVA analysis test results showing the difference between class groups in the average scores obtained in SSCE and Design exams

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
SSCE composite score	Between Groups	2.654	4	.664	5.096	.001
	Within Groups	14.064	108	.130		
	Total	16.719	112			
Architectural Design composite score	Between Groups	3.591	4	.898	1.963	.105
	Within Groups	49.404	108	.457		
	Total	52.995	112			

Source: Fieldwork, 2018

To further establish, more clearly, the nature of difference between the groups, a Tukey HSD post-hoc test was carried out on the data. This is shown in Table 3. The results indicated that the significant difference which occurred was only between the 2010 class and the 2013 class (.004). There was no significant difference between any other pair of groups.

Table 3: Tukey HSD Post Hoc analysis test results showing the nature of difference between class groups in the average scores obtained in SSCE and Design exams

Multiple Comparisons							
Tukey HSD							
Dependent Variable	(I) Class groups	(J) Class groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
SSCE composite score	2009 class	2010 class	.05584	.11187	.987	-.2545	.3662
		2011 class	-.14522	.13669	.825	-.5245	.2340
		2012 class	-.25966	.09633	.061	-.5269	.0076
		2013 class	-.34122*	.10426	.012	-.6305	-.0519
	2010 class	2009 class	-.05584	.11187	.987	-.3662	.2545
		2011 class	-.20105	.14098	.612	-.5922	.1901
		2012 class	-.31550*	.10233	.021	-.5994	-.0316
		2013 class	-.39705*	.10983	.004	-.7018	-.0923
	2011 class	2009 class	.14522	.13669	.825	-.2340	.5245
		2010 class	.20105	.14098	.612	-.1901	.5922
		2012 class	-.11444	.12900	.901	-.4723	.2434
		2013 class	-.19600	.13502	.596	-.5706	.1786
	2012 class	2009 class	.25966	.09633	.061	-.0076	.5269
		2010 class	.31550*	.10233	.021	.0316	.5994

		2011 class	.11444	.12900	.901	-.2434	.4723
		2013 class	-.08156	.09395	.908	-.3422	.1791
	2013 class	2009 class	.34122*	.10426	.012	.0519	.6305
		2010 class	.39705*	.10983	.004	.0923	.7018
		2011 class	.19600	.13502	.596	-.1786	.5706
		2012 class	.08156	.09395	.908	-.1791	.3422

*. The mean difference is significant at the 0.05 level.

Source: Fieldwork, 2018

Significant relationship between SSCE and Design scores amongst class groups

Hypothesis was tested for each individual class, as well as for the combined data set and is presented thus:

(i) 2009 Class:

The result of the analysis showed a Pearson's correlation coefficient value of 0.513 with a significance value point of 0.012. This implies a moderate, positive relationship exists between the two variables for this class. The significance value of 0.012 shows it is significant at 95% confidence level. This is shown in Table 4. Here the hypothesis proved untrue.

Table 4: Pearson's product moment correlation analysis result of relationship between SSCE scores and Design scores for 2009 class

2009 CLASS		Architectural Design composite score
SSCE composite score	Pearson Correlation	.513*
	Sig. (2-tailed)	.012
	N	23

Source: Fieldwork, 2018

(ii) 2010 Class:

The Pearson's correlation coefficient value for the analysis for this class was -0.431, with a significance value point of 0.065. This indicates a moderate, negative relationship exists between the two variables here. The significance value of 0.065 shows the relationship is not significant at 95% confidence level. This is shown in Table 5. Here, the hypothesis is found to be true.

Table 5: Pearson's product moment correlation analysis result of relationship between SSCE scores and Design scores for 2010 class

2010 CLASS		Architectural Design composite score
SSCE composite score	Pearson Correlation	-.431
	Sig. (2-tailed)	.065
	N	19

Source: Fieldwork, 2018

(iii) 2011 Class

The result of the analysis showed a Pearson's correlation coefficient value of 0.663 with a significance value point of 0.037. This implies a moderate, positive relationship exists between the two variables for this class. The significance value of 0.037 shows it is significant at 95% confidence level. This is shown in Table 6. In this class, the hypothesis is found untrue.

Table 6: Pearson's product moment correlation analysis result of relationship between SSCE scores and Design scores for 2011 class

2011 CLASS		Architectural Design composite score
SSCE composite score	Pearson Correlation	.663*
	Sig. (2-tailed)	.037
	N	10

Source: Fieldwork, 2018

(iv) 2012 Class

The Pearson's correlation coefficient value for the analysis for this class was 0.044, and the significance value was 0.799. This indicates a low, positive relationship exists between the two variables here. The significance value of 0.799 shows the relationship is not significant. This is shown in Table 7. Thus in this class, the hypothesis proves true.

Table 7: Pearson's product moment correlation analysis result of relationship between SSCE scores and Design scores for 2012 class

2012 CLASS		Architectural Design composite score
SSCE composite score	Pearson Correlation	.044
	Sig. (2-tailed)	.799
	N	36

Source: Fieldwork, 2018

(v) 2013 Class

Analysis for this class, showed a Pearson's correlation coefficient value of 0.081, and a significance value point of 0.699. This shows that a very low, positive relationship exists between the two variables here. It's is also not significant at 95% confidence level. This is shown in Table 8. Also here, the hypothesis proves to be correct.

Table 8: Pearson's product moment correlation analysis result of relationship between SSCE scores and Design scores for 2013 class

2013 CLASS		Architectural Design composite score
SSCE composite score	Pearson Correlation	.081
	Sig. (2-tailed)	.699
	N	25

Source: Fieldwork, 2018

(vi) Combined Data For All Classes (2009-2013)

All data sets for the classes 2009 -2013 were merged into a single data set and analysed. The result of the analysis showed a Pearson's correlation coefficient value of 0.216 with a significance value of 0.022. This implies a low, positive relationship exists between the two variables when all class data sets are combined. The relationship is however, significant at 95% confidence level. This is shown in Table 9. In this combined data set, hypothesis 2 is rejected.

Table 9: Pearson's product moment correlation analysis result of relationship between SSCE scores and DESIGN scores for combined data

Combined data		Architectural Design composite score
SSCE composite score	Pearson Correlation	.216*
	Sig. (2-tailed)	.022
	N	113

Source: Fieldwork, 2018

DISCUSSION

1. Significant difference between the class groups in the SSCE and Design scores

The results of the ANOVA test in Table 2 showed that, notwithstanding individual performances, average class performances were generally the same. It is true that for average scores in SSCE, the results showed a significant difference in performance. However, the Tukey-HSD test to show the nature of differences revealed that this was only between the 2010 class and the 2013 class. There was no significant difference between any other pair of groups for this preliminary requirement score. For the average design score, there was also no significant difference amongst class groups, irrespective of individual performances by students. It can thus be inferred that the perceived trend in decline in performance at entry is not evident in results submitted at entry within the period studied. Also, even where there was a significant difference in average scores among classes, for entry requirements, this did not necessarily translate to similar differences in average scores in the design course for these class groups. It is reasonable, therefore, to conclude that other factors, other than academic ability before enrolment, contributed in determining performance post enrolment. It is still possible that these other factors could possibly trigger a different result if brought into the equation. This agrees with Mlambu (2011) who opined that academic performance was influenced by a combination of factors and that these varied from one academic environment to another, one set of students to another, and from one culture to another.

2. Significant relationship between SSCE and Design scores amongst class groups

The results of analyses shown in Tables 4-9 indicate that the nature of relationship between the two variables under consideration is not consistent across classes and the combined data set. Whereas, the results showed significant correlation of the variables in 2009 CLASS, 2011 CLASS and the COMBINED CLASS DATA, they showed no correlation in the 2010 CLASS, 2012 CLASS AND 2013 CLASS. It would therefore appear to be erroneous to simply use any of these data sets singly or in combination to make conclusions as to the basis for predicting performance of students after enrolment in the Architectural Design. This therefore lends credence to the assertion that notwithstanding its relevance to the issue of students' academic performance, entry requirements must be investigated alongside other factors to obtain a more complete picture of what determines success. This agrees with Naidoo, Motala and Joubert (2013), Killen (2002) and Mlambu (2011).

The importance of entry requirements as a means of ensuring that students possess a minimum level of relevant previous knowledge, prior to undertaking the rigours of tertiary education, cannot be understated. The belief that learning is a cumulative process, hence present learning is predicated on success in the previous ones is still an underlying imperative in education theory (Wambugu & Emeke, 2013). However, the faith placed on this statistic as a predictor of academic success, post entry into the institutions, is on shaky grounds.

CONCLUSION

From the foregoing, based on the criteria chosen for determining performance before enrolment into the university and that for determining success in the design course for architecture students, it can be concluded that in COOU,

i. Differences in average scores at entry did not necessarily translate into concurrent differences in academic performance after entry into the programme. Sometimes it did, but at other times, it did not.
ii. Even where average entry scores appeared similar for different classes, different results for design could occur. It can therefore be reasonable to conclude that post-enrolment performance had multi-factorial causes.
iii. The nature of relationship between pre-enrolment scores and post-enrolment performance was not consistent for each class that enrolled in the architecture programme between 2009 and 2013. It was sometimes significant, while at other times this was not the case.
iv. It would therefore appear to be erroneous to simply use any of these data sets singly or in combination to make conclusions as to the basis for predicting academic performance of students after enrolment in their course of study.

RECOMMENDATIONS

Following the conclusions made, the following recommendations are proposed:

i. Entry requirements should not be used as the sole basis for predicting academic success of students.
ii. For better clarity on what influences academic success, stakeholders should adopt a multi-factorial approach to investigations, incorporating such factors as those identified by Mlambu (2011).
iii. Institutions should construct coherent policies that enable all sections within them to collaboratively create the conditions that will aid all students to succeed, irrespective of the attributes or capacities they enrol with.
iv. A multi-year or longitudinal design should be adopted while investigating the phenomena of academic success as conclusions based on cross-sectional frames may not be sufficient.

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