Socialisation Mediates The Relationship Between Learning Environments and Architecture Students' Academic Performance

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ABSTRACT

Good learning environments are often directly linked with academic success though controlling for other factors such as socioeconomic status and entry qualifications are constantly required. This study, re-examines the above premise using qualitative open-ended responses from 29 students majoring in architecture from Ahmadu Bello University as studies investigating this category of respondents are sparsely undertaken. Results from qualitative content analyses of 81 phrases reveal that although learning environment influences academic performance, a number of respondents, particularly males, categorically stated that it has no influence on their academic performance. The findings thus assert that providing conducive learning environments may not always translate into good grades to students. Socialisation and interactions between staff and students as well as student-to-student interactions emerged as mediators in the learning environment-academic performance relationship. The need for socialisation and support was pertinent for lower levels, while inadequacy of facilities notably classrooms and studio space influenced postgraduate students more. IEQ variables such as noise and thermal comfort, security as well as assessment modalities also influence academic performance.

1. Introduction

Learning environments (LE) have gained research attention in recent years, in part due to perceived links to academic performance of students especially in Higher Education (HE). LE comprises diverse physical locations, contexts and cultures within which learning occurs (Ibem, Alagbe & Owoseni, 2017). Prayoonwong and Nimnuan (2010) assert focusing on LE is one way researchers understand how students learn. In fact, subjective perceptions of the LE, rather than objective aspects are said to facilitate learning (Saghafi, Franz & Crowther, 2012). According to Ellis and Goodyear (2016), "connections between place and learning can be subtle and powerful" (p. 150). McRobbie, Roth and Lucus (1997) explain that students' perception of their classroom environments as well as psychosocial interactions, which occur within them affect academic achievement. In support of these claims, a recent study established air quality in classrooms, good views, space allocation, sound, quality of furniture and lighting affect academic performance (Abdulkadir, 2018).

Academic performance, on its part, enjoys tremendous research appeal due to its established association to socioeconomic development and advancement (Alshammari, Saguban, Passay-an, Altheban & Al-Shammari, 2018; Olufemi, Adeniran & Oyediran, 2018; Opoko, Alagbe, Aderonmu, Ezema & Oluwatayo, 2014; Mustaq & Khan, 2012; Hanushek, Jamison, Jamison & Woessmann, 2008). Academic performance is also linked to employability of graduates and prospects of a better life (AlMurtadha, Elfaki & Abdalla, 2016; Masrek & Zainol, 2015; Ghaemi & Yazdanpanah, 2014; McCowan, 2014). Often referred to in literature as academic achievement (Alos, Caranto & David, 2015) or academic success (Aluko, Adenuga, Kukoyi, Soyingbe & Oyedeji, 2016), academic performance denotes attainment of learning objectives, acquisition of desired skills and competencies, satisfaction of completing academic activities and overall post college performance (ibid). It is usually measured using grade point average (GPA) or its cumulative equivalent (CGPA). Dixson, Keltner, Worell and Mello (2017) summarise benefits associated with high academic achievement as increased probabilities of gaining employment, attending graduate school and increased income after college. Better self-discipline, decision-making skills and higher IQ scores comprise other notable advantages. Overall, academic achievement is a good indicator of key aspects of a person's life.

Due to the aforementioned association between LE and academic performance, the assumption is that a linear relationship exists between the two constructs, with one directly influencing the other. Indeed, it is presumed that students will produce better grades within good LE, after controlling socioeconomic factors and entry qualifications. Ibem et al. (2017) affirm this observation by asserting that students in good LE undoubtedly attain higher achievement as a good LE frees students from the problems of stress, making concentration easier for schoolwork and logical thinking. Ellis and Goodyear (2016) also allude to this observation, noting that university spaces ought to support learning. This study investigates students' perspective of their learning environment at the department of Architecture, Ahmadu Bello University being the pioneer school of architecture in Nigeria. The paper specifically re-examines the premise that LE and academic performance are directly related. It tests the hypothesis that other factors may mediate between LE and academic performance using student responses from a public school of architecture in northern Nigeria as studies investigating the perception of this category of students about their LE are very rare (Oluwatayo, Aderonmu & Aduwo, 2015). Architecture is a discipline combining arts and science and is heavily dependent on architectural design studio (ADS), which is at the core of the architectural curriculum (Bashier, 2014; Megahed, 2018).

Maina, Marafa and Daful (2018) report several factors which influence academic performance in the study area. These are cost of equipment, relationship with other students, quality of natural light in studios, quality of lecturers' experience, parents'/guardians' income, collaboration with other colleagues as well as air quality in studios. These variables record mean importance values equal to or above 3.5 out of 5. Overall, the study found that architecture students in the study area were affected more by school based variables than socioeconomic

variables, in constrast to their counterparts at the University of Jos. Consequently, this study also assesses the extent to which LE as a component of school based variables influences academic performance and behaviour.

2. Review Of Related Literature

2.1 Learning Environments And Academic Performance

Learning connotes all activities students engage in purposefully in an educational setting (Ellis & Goodyear, 2016). The result of successful learning usually means understanding a phenomenon, process, principle, mechanism or event. Learning could also result in acquiring a skill or the ability to successfully complete a task (ibid). LE denotes myriad settings and activities that facilitate learning. It encompasses the culture of a school or class, including policies, rules, ethos and organisation. This includes the manner students interact with each other as well as ways teachers organise an educational setting to enable learning (Ibem et al., 2017). LE in literature relating to academic performance are commonly discussed under facilities (or infrastructure, including equipment and utilities), teacher and students' characteristics. This is because these three categories of LE are located within school environments and are the major variables that influence academic performance after controlling socioeconomic status (SES) and entry qualifications. These last two variables are traditionally outside the scope of school/institutional jurisdiction within which LE are located.

Facilities refer to the physical setting and environmental features of spaces and places that facilitate learning. These maybe formal and structured, such as classrooms, lecture halls, laboratories, offices, seminar rooms, libraries, hostels, cafeteria and other support spaces as well as utilities such as electricity and water supply, internet services, security etcetera. Typically, these have been the focus of the vast majority of studies in learning spaces literature largely due to two reasons. First, huge sums are spent on design, planning, construction and management of physical spaces and university facilities (Ellis & Goodyear, 2016). Rising student enrolment rates have necessitated an infusion of funds into the global education sector in recent years, with the wisdom of further investment into physical spaces in question (ibid). Secondly, the emergence of virtual online learning challenges traditional ways of learning. Issues of whether physical learning spaces offer advantages over virtual learning remain under-researched. Facilities such as open spaces are also employed informally for discussions, collaborative work and relaxation (Adedayo, Oyetola, Anunobi & Adebayo, 2017). These have gained research interest in recent times as learning is now becoming experiential, with students employing available spaces on campuses for learning (Maina, 2017; Ellis & Goodyear, 2016; Gebhardt, 2014).

Studies on facilities are generally context specific and establish several physical features as influences on academic performance on university campuses. These are commonly proximity to hostel accommodation (Adama, Aghimien & Fabunmi, 2018; Maina &

Aji, 2017; Owolabi, 2015), adequacy of utilities (Frimpong, Agyeman & Ofosu, 2016), indoor environmental variables such as noise, lighting, ventilation (Abdulkadir, 2018; Davies & Lee, 2007; Higgins, Hall, Wall, Woolner & McCaughey, 2005), quality and adequacy of classrooms/lecture halls as well as other formal educational settings (Abdulkadir, 2018; Akhihiero, 2011) as well design spatial configuration (Fouad & Sailer, 2017). There is also strong evidence in literature to suggest teaching quality critically influences academic performance (Simoes & Alarcao, 2014; Fong-Yee & Normore, 2013). Alos, Caranto and David (2015) assert quality of teaching is the most important school-related factor influencing academic achievement. Although a few studies report high self-esteem is associated with low student-teacher relationships (Nyadanu, Garglo, Adampah & Garglo, 2015), some affirm that subject knowledge, teaching skills, lecturer attendance and attitude have significant positive influence on academic performance (Mustafidah, 2014; Muzenda, 2013). Elegbe (2018) reports quality of lecturer's interpersonal communication with students will positively or negatively influence their academic performance. This is more pertinent for younger students. Student characteristics influencing academic performance in literature usually relate to SES factors such as gender (Borde, 2017), motivation (Fernando, 2017; Sugahara & Boland, 2014), entry qualifications, social background (Dixson et al., 2017), parental and individual characteristics of students (Usman, Mukhtar & Auwal, 2016; Wu, 2014).

2.2   Learning Environments And Academic Performance Of Architecture Students

Several studies establish the influence of features of the learning environment, especially facilities and SES on the academic performance of architecture students. Opoko, Oluwatayo and Ezema (2016) established nine factors that influence academic performance of architecture students at private universities in southwest Nigeria. LE, comprising campus environs, relationship with staff, cafeteria, shopping facilities/buttery, relationship with other students, quality of classrooms, studios, workshops and hostels accounted for the highest number of variables. Library use dwindled largely due to easy access to the internet. This finding echoes results from Rugutt and Chemosit (2005) where internet, campus technology and student achievement were significantly and negatively related to academic performance. Opoko et al. (2016) also report the unique place studio traditionally holds at the core of the architecture curriculum has been lost. In a qualitative research similar to the present study, Ibem et al. (2017) report 45.5% of respondents emphasised variables related to physical conditions within facilities as major components influencing LE. These are lighting, ventilations/air quality, noise levels, colour and decoration. A student notes, *"My opinion is that the right structure is required in learning for good results or outcome, just like an athlete requires good training facilities for better results so is environmental facilities (including architectural structures) important for learning"* (p. 6280). Furniture arrangement and physical conditions were also considered key components of LE by 54.5% of respondents, with a student noting, *"A conducive environment propels learning. Space and design of the class room, seating arrangements for proper engagement"* (p. 6282).

Quality of student accommodation also affects academic performance of architecture students in northwest Nigeria, with students accommodated on campus likely to graduate with an average grade equivalent to second class lower division against students living off campus, who on average would graduate with third class degrees (Maina & Aji, 2017). Ibem et al. (2017) established that LE influences self-awareness, focus, synergy, comfort, concentration and psychological balance of architecture students. This translates to higher productivity in terms of creativity in design. The emergence of perceived support as an additional dimension however suggests that tutor and peer connection is important (Oluwatayo et al., 2015). Although good teaching was not perceived as a significant predictor of academic grades, results from the study suggests that LE in architecture education relates to space and effectiveness of the teaching process as well as involvement of students in creating knowledge (ibid). The complex nature of architecture training comprising theoritical and studio based modules (Hasan, Baser, Razzaq, Puteh & Ibrahim, 2017) may be responsible for this incongruent result.

SES likwise influence academic performance of architecture students. Level of study and age were important as older students indicated the lowest positive assessment but higher ratings for conduciveness of the LE (Oluwatayo et al. 2015), collaborating findings from Elegbe (2018). Gender also matters, as males record higher perceptions of the LE than females (Oluwatayo et al. 2015). This trend is echoed by findings from Opoko et al., (2015) which report students' age, gender, access to counselling and occupation of mothers significantly predict academic performance. Entry qualifications, specifically grades in Maths, Physics, Chemistry and the local language (Yoruba) signifcantly predict academic success for architecture undergraduates in Southwest Nigeria (Aluko et al., 2016).

3.   Methodology

In order to explore students' perception of LE in the study area, we adopted a qualitative case study approach with elements of grounded theory to explore emerging ideas from the student perspective. The study specifically employed open-ended questionnaires in lieu of interviews because students in previous studies were ill at ease during interviews, often modifying responses to fit what they thought researchers want to know (Maina, 2018). Questionnaires are anonymous. Interviews are not. Modifying responses may be rooted in social practices prevalent in the study area. It is expected that a younger person defers to the wishes of an elder as a sign of respect especially for those in authority. A notable disadvantage of employing open-ended questionnaires in place of interviews however is opportunites to further probe emerging ideas are lost as respondents may only provide answers to stated questions. To mitigate this limitation, respondents were requested to take the questionnaires home, fill them at leisure and submit same to their class representatives within two weeks.

Cresswell (2014) suggests employing 20-30 people for case studies and grounded theory. Questionnaires were randomly distributed to 40 respondents, an average of 8 per class across five

levels in the department just prior to the second semester examinations late in October 2018. This is when students are most likely in school preparing for examinations. The slightly large number for a qualitative approach was choosen to make up for the possibility of low retrieval rates, considering respondents had been instructed to return questionnaires within two weeks. The 300 level class was away on mandatory Student Industrial Work Experience Scheme (SIWES) and did not form part of the survey. This is another limitation of the study. A total of 31 (76%) questionnaires were returned.

We designed the questionnaire in two sections. The first elicits demographic information regarding level and gender, two significant variables recurring in literature reviewed on the relationship between LE and academic performance for students of architecture (Oluwatayo et al., 2015; Opoko et al., 2015). The second section requested a description of how LE in the department influences academic performance and behaviour (Ibem et al., 2017). The procedure employed to content analyse responses, based on Lune and Berg (2017), is presented below.

1. Responses were collated verbatim into a word document with relevant demographic data. These usually comprise several sentences stating opinions about LE, academic perfomance and behaviour/actions. Corrections to obvious spelling errors were effected by the second author and verified by the first to improve readability of responses. Such corrections are denoted by [sic].

2. We then grouped the sentences into phrases containing a single idea or expressing a thought, in line with Lune and Burg's (2017) definintion of content analyses being a "careful, detailed, systematic examination and interpretation of a particular body of material in an effort to identify patterns, themes, assumptions and meanings" (p. 182). We employed phrases as units of analysis because multiple phrases within a single sentence often relate to different ideas (see example in Table 1). This was the first stage of coding.

3. We colour coded responses based on themes for easy identification (Table 1)

4. We subjected the entire document to this process three times to ensure agreement and congruency of classification. Responses from two female respondents were taken out of the analyses as these focused on ideal LEs and not what it currently is in the department. We identified a total of 81 phrases in the document. These form the basis of all analyses in the study.

5. Sub-themes were inductively derived from the three major themes based on similarity of ideas, thought and synonyms in the second stage of data coding (see Table 1 for example). Some sub-themes were subsequently merged, for example Socialisation, Interaction and support as many responses contained related words and ideas.

6. Frequencies of occurrence of sub-themes are presented as numbers of phrases, with percentages expressed within brackets (%).

7. Findings from these processes are discussed within results and discussion sections in suceeding paragraphs.

Table 1 Coding employed for content analyses

Level	Gender	Response	Theme	Sub-theme
100	Female	• The learning environment in the department has influenced me to be getting along with others	• LE	• Socialisation
		• Especially by sharing ideas, helping me get through difficult home and class works.	• LE	• Interaction/support
		• I think academic performance is based on one's personal effort,	• Academic performance	• Academic Performance based on self effort
		• Behaviourally [sic], the learning environment has made me to be more flexible and cheerful.	• Behaviour, actions	• Positive behaviour
		Legend: LE Academic Performance Behaviour		

4.   Results and Discussion

4.1   Results

Results from the demographic section of the questionnaire illustrate students from 200 level returned all questionnaires distributed within the class (N 8, 26%). The fact that one of the authors takes a course for that level likely influenced retrieval rates, supporting our earlier assertion that authority influences completion of tasks and modifies responses in the study area. Retrieval rates were also high for 400 level and MSc II and lowest for 100 level and MSc I (Figure 1). Students in higher levels are familiar with the importance and implications of research, unlike their 100 level counterparts who have barely spent a year within higher education institutions (HEIs). This result supports Oluwatayo et al.'s (2015) finding that level of study (and by implication age) is an important variable for assessing LE in architecture education.
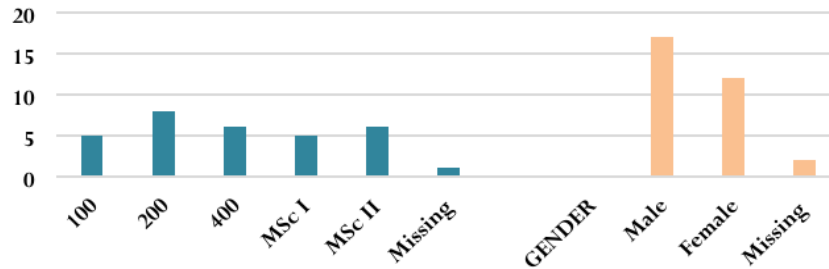

Figure 1 Data in percentage for level and gender of respondents

The first stage of coding revealed that students described the influence of LE on academic performance and behaviour into these three categories. LE elicited the highest number of phrases (39). Comments on academic performance (33) closely follow. Behaviour and actions, with nine (9) phrases, recorded the lowest frequencies (Figure 2).
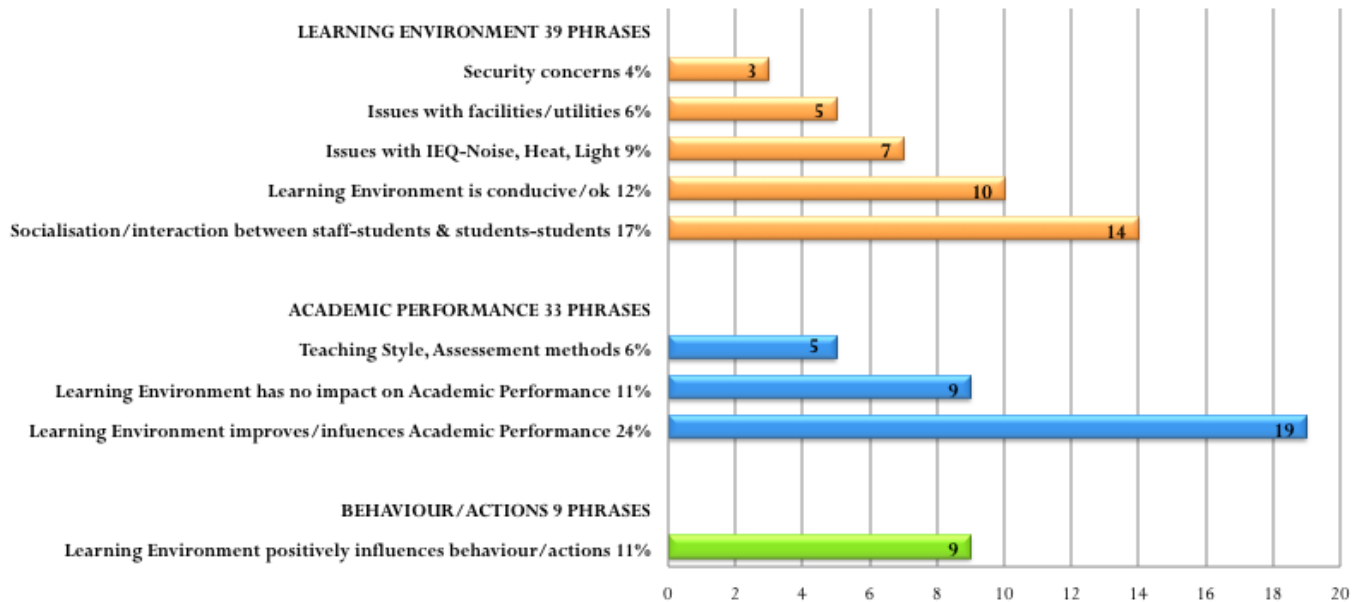

Figure 2 Frequencies of themes and sub-themes derived from phrases regarding influence of LE on academic performance and behavior

Results from the second stage of detailed coding indicate comments regarding positive influence of LE on academic performance record the highest frequencies (N 19, 24%). These account for almost a quarter of all responses (Figure 2). Comments on relationships, notably socialisation between students and staff as well as student-to-student interactions (N 14, 17%) follow these. Conduciveness of the LE (N 10, 12%), LE having no impact on academic performance as well as positive influence of LE on behaviour both record frequencies of 9 (11%). Comments out of these categories, which record lower frequencies focus on negative aspects of the LE in need of improvement, notably facilities and utilities, teaching style and assessment methods as well as security concerns (Figure 2). Overall, responses about socialisation and interaction occurred more in lower level undergraduate levels in contrast to

inadequacy of facilities notably classrooms and library frequently stated by masters students.

4.2　　Discussion

4.2.1　　LE Influences Academic Performance

Students generally associate academic performance to LE as this category of sub themes recorded the highest frequency from our data. This finding lends credence to studies ascribing a direct relationship between LE and academic performance such as Ibem et al., (2017) as well as Ellis and Goodyear (2016). Several respondents note

> *"The learning environment is very conducive and for that it helps the students to do well in their academics"*
> *"The environment is very conducive for a good learning environment it really helps [sic] us to understand the real concept of architecture in our life"*
> *"The department of architecture has a well-structured living [sic] pattern for the studio, with reasonable times and hours attached to it"*
> *"The learning environment is 70% conducive for learning"*
> *". . . the departments learning environment is encouraging"*

Despite such statements, nine students indicate that LE has no impact on their academic performance. This accounts for 11% of total phrases employed for the analyses. These respondents often ascribe academic performance to personal effort. With the exception of one female, this category of comments all came from male respondents.

> *"The environment has little impact on my academic performance as personal feeling and motivation plays a greater role in academic performance"*
> *"My performance [sic] is based on my hard work not on the learning environment"*
> *"The learning environment is good but not at its best state, it doesn't affect or influence my performance"*
> *"The learning environment in the department is okay. It has nothing to do with my academic performance"*
> *"I think academic performance is based on one's personal effort"*

Results from this sub-theme suggest that while LE is perceived to directly influence academic performance, other variables likely mediate this relationship. In other words, the fact that LE is conducive on average may not always translate to better academic performance per se, controlling for other variables. Several authors have investigated the role personal motivation plays in academic performance. Geiger and Cooper (1995) found students who take personal responsibility for their performance perform at higher levels than those who attribute success or failure to other individuals and circumstances. Similarly, Fernando's 2017 study established self motivation as the most determinant factor of academic performance among undergraduates of Management and Commerce at a university in Sri Lanka. Self motivation, according to the study accounted

for 46.4% of the variance. This trend was also echoed by Sugahara and Boland (2014), who report self effort, not lecturer qualities or lecture attributes constitute key drivers of academic success among 183 postgraduate students in Accounting Schools in Japan. Salmi and Thuneberg's 2019 investigation of sixth graders in Finland revealed that motivation in learning science was related to how autonomous students feel. Authors note, "the most important enhancer of situational motivation was liking science learning in school but this was true only among boys" (p. 43). In our study, all but one of such emphatic statements on self-effort comes from males. This observation suggests that independence and autonomy related to the male gender may be responsible for academic success and not necessarily LE.

4.2.2　　Social Interactions Mediate LE And Academic Performance

In support of the hypothesis put forward at the beginning of the paper, results from the second highest frequently occurring sub-theme suggest that socialisation and interactions mediate the relationship between LE and academic performance, at least for architecture students. This is may be related to the nature of the architecture curriculum organised around design studio characterised by interactions and critique by both peers and mentors (Oh, Ishizaki, Gross & Do, 2013; Bashier, 2014; Megahed, 2018). Social interactions and relationships can not be divorced from studio based programmes. Respondents note:

> *"The learning environment influences academic performance by allowing students of lower classes interact with others of higher classes thereby acquiring much more knowledge better than the one taught"*
> *"The diverse nature of people help us the students to learn a wide variety of things whether consciously or not ideas are just passed"*
> *"Behaviour [sic] being [sic] the department collected all together in one building for both staff and students have made it possible to have easy interaction and moderation"*
> *"The learning environment encourages student networking and this is important for me because I am influenced by the work and progress of my colleagues"*
> *"The learning environment is 70% conducive for learning as there is good lecturer-student relationship and also good student-student relationship. This encourages team work and hard work and broadens the students' horizon"*

Influences of mediating variables are not uncommon in literature related to academic performance and learning. Dixson et al. (2017) report personal attitude of a student mediates academic performance and SES and that high hope and motivation of an individual is capable of overcoming disadvantages of low SES. Thomas, Pavlechko and Cassady (2018) likewise report relataionship between instructor effectiveness and academic engagement was partially mediated by influences interactive learning spaces exerted on activities implemented in class. In our study, we find socialisation and interaction capable of boosting morale towards better performance. This is especially true for undergraduate students.

With increasing focus on interactions and collaborations globally, it is worthy to note that LE in HEIs can be maximised with the right atmosphere and environments that foster interactions and social relationships. Several authors allude to the fact that the non-tangible aspects of LE, notably socialisation and interaction are critical to knowledge diffusion (Matthews, Andrews & Adams, 2011; Gebhardt, 2014) as well as knowledge sharing behaviour (Appel-Meulenbroek, de Vrie & Weggeman, 2016). This is especially pertinent in our study context where informal social interactions are part of the cultural set up in northern Nigeria (Maina & Dauda, 2017). Perhaps due to its prominence in everyday informal activities, the role socialisation plays seems muted and under researched within formal and academic environments. Precise mechanisms and pathways socialisation and interaction mediate LE and academic performance begs further investigation as it is out of the scope of the present study.

4.2.3   *State/Availability Of Facilities, Utilities And Teaching Style Also Influence Academic Performance And Student Behaviour*

Respondents note other variables likewise influence academic performance from the viewpoint of LE. These include inadequacy of facilities notably classrooms and studio space, IEQ variables, teaching style especially assessment methods as well as security concerns (Figure 2). Results regarding physical conditions of facilities support findings of Ibem et al. (2017) as a respondent noted, *"Physical conditions like temperature, air quality, noise and acoustics do affect learning"* (p. 6282). Despite a number of responses stating adequacy and conduciveness of the LE, students decried inadequacy of classroom spaces, high noise levels, uncomfortable studios in terms of thermal comfort, lecturer assessment methods such as giving tests at the end of the semester when students are already overwhelmed. The finding on physical aspects of LE and influence of IEQ variables on academic performance reinforces earlier findings in the study area by Maina et al., (2018), where quality of natural light in studios, quality of lecturer experiences as well as quality of air in studios were ranked third, fourth and sixth respectively out of a total of 44 variables. Security concerns also pose some challenges.

> *"The classes and studio especially for masters' students should be enhanced to encourage their progress"*
> *"More classes should be provided for MSc students specifically to encourage discussions [sic] within the students"*
> *"Because of inadequate classrooms and unavailability of libraries for studying, students are not in class during study time. This has made me adapt to combining all activities in just one available academic facility (studio)"*
> *"The facilities on the other hand do not encourage me much due to large amount of distraction around"*
> *"The learning environment is quite disturbing"*
> *"So I advise studios to be locked and keys given to responsible person to reduce the nuisance that usually occur"*
> *"But studios can be hot during the day and we don't have much security"*

> *"Am not comfortable with the idea of having test close to the end of the semester. It should be made have way through so that students won't be crashing so many things at the end of the semester"*

These present areas in need of attention by the department. Growing population of students admitted into Nigerian public institutions with an inadequate attendant expansion of facilities (Akhihiero, 2011) means that many facilities and resources, including quality of teaching staff are overstretched. The latter emerged as a problem in a recent study of the department (Maina, 2018). Results also present other intervening variables likely to influence the direct relationship between LE and academic performance.

4.2.4   *Need For Socialisation Is Higher At Lower Levels, PG Students Decry Inadequate Facilities*

Issues regarding the need and usefulness of socialisation and interaction between students and sometimes staff came from lower level students, while the issue of inadequate classrooms and library facilities were from MSc students in the sample. This finding collaborates reports from Oluwatayo et al., (2015) where perceived support emerged as a possible important facet in LE for architecture students. A similar conclusion was drawn at the University of Ibadan (Elegbe, 2018) where results of interviews wiith students revealed that interpersonal communication was a key variable in student success, particulary for younger students. Lecturers are responsible in creating an environment where students can express themselves beyond discussions and lectures. The need for more interaction in early years is understandable as students are adjusting to a new system they are unaccustomed to away from familiar territory and family. Older students and staff form part of the new LE and thus psychologically, new entrants need adequate support in school. Older students have already acclimatised to the local environment and are more grounded, thus likely to exhibit higher levels of independence and autonomy. The focus of older students in our study on facilities is likely related to research requirements at the end of the program. MSc students specifically need such facilities to complete their dissertations and are more likely to notice inadequacy of learning spaces and facilities.

5.   Conclusions

We investigated the relationship between LE and academic performance from the perspective of students of architecture as such studies are rare. We specifically explored evidence from qualitative responses to test the premise that the relationship between LE and academic performance is linear, after controlling for SES and entry qualification variables. Results from content analyses of open-ended questions reveal several key findings.

First, while LE was generally conducive it also influenced academic performance, recording the highest frequency (24%) within sub-themes. This supports proponents of a direct relationship between LE and academic performance. It indicates

that providing a conducive LE influences academic performance positively. This finding justifies efforts by government and other agencies including individuals in realising improved facilities and utilities in Nigerian HEIs.

Secondly, 11% of respondents categorically state that LE does not influence their academic performance, eliciting the presence of other factors notably the role of self or personal effort in academic success and achievement. Evaluating the role self-effort plays in academic performance is beyond the scope of this paper. It presents an area for further investigation, bearing gender as a variable in this discourse as all but one of such responses were supplied by male respondents.

The third finding is socialisation and interaction influences academic performance, accounting for 17% of responses. It suggests relationships with staff and students mediate LE and academic performance, as least for architecture students. This may also be true for other disciplines based on design studio and collaborative programs. Future studies are required to test the accuracy of this finding using a larger and more varied sample. Additionally, university authorities and administrators in HEIs need to strike a balance between providing facilities and the intangible but salient aspect of human support, interaction and socialisation that drive collaboration and innovation. This point cannot be overemphasised especially in public institutions in Nigeria and Sub-Saharan Africa where enrolment rates into HEIs are on the increase (McCowan, 2014). The tendency to focus on providing tangible facilities is high, often at the expense of intangible resources such a staff support for students. This is especially true for architecture schools in public universities.

Fourthly, the need for socialisation was found to be delineated along classes, with lower level students commenting more on its influence on their academic performance than postgraduates. Attention should be paid by administrators of architecture departments to lower classes in this regard to enable them adjust and reduce probabilities of attrition and low academic performance. Importance of student-to-student interaction likewise emerged from our data. Further studies how best to optimise an available, often untapped resource in the form of peer mentoring among students are required to bridge the gap in the need for socialisation and interaction. Teaching staff alone are unlikely to provide adequate support in this regard (Zamberlan & Wilson, 2015). Consequently, consideration for peer assessment rubrics to aid student-to-student interaction and relationships in design-based programs such as architecture are timely. This recommendation echoes calls by Eshun (2016) for future research to establish modalities on peer assessment to provide rubrics for use in studio based programs.

Acknowledgements

References

Abdulkadir, A. (2018). Students' perception of Classroom Design And Their Academic Performance: A Case Study of Department of Urban and Regional Planning, Ahmadu Bello University Zaria. (BSc research project, Department of Architecture, Ahmadu Bello University, 2018). Zaria: Ahmadu Bello University.

Adama, J. U., Aghimien, D. O. & Fabunmi, C. O. (2018). Student housing in Private Universities in Nigeria: Influencing Factors and Effect on Academic Performance. *International Journal of Built Environment and Sustainability*. 5(1): 12-20. DOI: 10.11113/ijbes.v5.n1.242.

Adedayo, O. F., Oyetola, S. A., Anunobi, A. I. & Adebayo, O. A. (2017). Student's Perception of Informal Interaction Spaces in Faculty Buildings of Federal University of Technology Minna, Nigeria. *Journal of Interior Designing and Regional Planning*. 2(2): 1-16.

Akhihiero, E. T. (2011). Effect of Inadequate Infrastructural Facilities On Academic Performance Of Students of Oredo Local Government Area of Edo State. *The Nigerian Academic Forum. 20*(1): 1-6.

AlMurtadha, Y. M., Elfaki, A. O. & Abdalla, O. A. (2016). Factors Influencing Academic Achievement of Undergraduate Computing Students. *International Journal of Computer Applications. 146*(3): 23-28.

Alos, S. B., Caranto, L. C. & David, J. T. (2015). Factors Affecting the Academic Performance of Student Nurses of BSU. *International Journal of Nursing Science, 5*(2): 60-65. DOI: 10.5923/j.nursing.20150502.04.

Alshammari, F., Saguban, R., Pasay-an, E., Altheban, A. & Al-Shammari, L. (2018). Factors Affecting The Academic Performance Of Student Nurses: A Cross-Sectional Study. *Journal of Nursing Education and Practice. 8*(1): 60-68. DOI: 10.5430/jnep.v8n1p60.

Aluko, R. O., Adenuga, O. A., Kukoyi, P. O., Soyingbe, A. A. & Oyedeji, J. O. (2016). Predicting The Academic Success Of Architecture Students By Pre-Enrolment Requirement Using Machine-Learning Techniques. *Construction Economics and Building. 16*(4): 86-98. DOI: 10.5130/AJCER.v16i4.5184.

Appel-Meulenbroek, R., de Vries, B. & Weggeman, M. (2016). Knowledge-Sharing Behavior: The Role of Spatial Design in Buildings. *Environment and Behavior*, 1-30. DOI: 10.1177.0013916516673405.

Bashier, F. (2014). Reflections on architectural design education: The return of Rationalism in the Studio. *Frontiers of Architectural Research, 3*: 424-430. DOI:10.1016/j.foar.2014.08.004.

Borde, S. F. (2017). Student Characteristics and Performance in Intermediate Corporate Finance. *Journal of Financial Education, 43*(1): 1-13. https://www.jstor.org/stable/10.2307/90018415.

Cresswell, J. W. (2014). Research Design: Qualitative, Quantitative and Mixed Methods Approaches. Los Angeles: SAGE.

Davies, H. & Lee, H. (2007). A review of the scope of scientific studies relating indoor environment and student performance. *41st Annual Conference of the Architectural Science Association ANZAScA* (pp. 70-75). Geelong, Australia: Deakin University.

Dixson, D. D., Keltner, D., Worell, F. C. & Mello, Z. (2017). The Magic Of Hope: Hope Mediates The Relationship Between

Socioeconomic Status And Academic Achievement. *The Journal of Educational Research*. 1-9. DOI:10.1080/00220671.2017.1302915.

Elegbe, O. (2018). Lecturers-Students' Interpersonal Communication: Implications for Students' Academic Learning. *Huria: Journal of the Open University of Tanzania. 25*(1): 28-54.

Ellis, R. A. & Goodyear, P. (2016). Models of Learning Space: Integrating Research on Space, Place and Learning in Higher Education. *Review of Education. 4*(2): 149-191. DOI:10.1002/rev3.3056.

Eshun, E. F. (2016). Graphic Design Students' Perspectives and Attitudes towards feedback within Peer Assessment in Design Studio Pedagogy. *International Journal for Innovation Education and Research. 4*(6): 22-33.

Fernando, R. S. (2017). Determinants of Academic Performance of Undergraduates of the Faculty of Management Studies and Commerce of the University of Sri Jayewardenepura in Sri Lanka. *PEOPLE: International Journal of Social Sciences. 3*(2): 1077-1101. DOI: 10.10319/pijss.2017.32.10771101.

Fong-Yee, D. & Normore, A. H. (2013). The Impact of Quality of Teachers on Student Achievement. Retrieved 20 December 2018 from https://digitalcommons.fiu.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1054&context=sferc

Fouad, A. T. & Sailer, K. (2017). The impact of spatial design on the learning process and students' socialisation: A study of Secondary Schools within the UK. In T. Heitor, M. Serra, J. P. Silva, M. Bacharel & L. C. de Silva (Ed.), *Procs., 11th International Space Syntax Symposium, 3-7 July* (pp. 11.1-16). Portugal: Instituto Superior Tecnico, Departmento de Engenharia Civil, Arquitetura e Georrecursos.

Frimpong, E. A., Agyeman, G. A. & Ofosu, F. F. (2016). Institutional Factors Affecting the Academic Performance of Polytechnic Students in Ghana. *International Journal of Humanities & Social Science Studies, II* (V): 102-109.

Gebhardt, C. (2014). The Spaces Between the Rooms: A Post Occupancy Evaluation of Informal Social Spaces in the HEDCO Education Building. (B.Arch Thesis, Department of Architecture, University of Oregon). Portland: University of Oregon.

Geiger, M. A. & Cooper, E. A. (1995). Predicting Academic Performance: The Impact of Expectancy and Needs Theory. *Journal of Experimental Education. 63*(3): 251-262. https://www.jstor.org/stable/20152454.

Ghaemi, F. & Yazdanpanah, M. (2014). The Relationship between Socio-economic Status and Academic Achievement in the EFL Classroom among Iranian University Students. *European Journal of English Language and Literature Studies. 2*(1): 49-57.

Hanushek, E. A., Jamison, D. T., Jamison, E. A. & Woessmann, L. (2008). Education and Economic Growth: It's Not Just Going To School, But Learning Something While There That Matters. *Education Next*. 62-70.

Hasan, A., Baser, J. A., Razzaq, R. A., Puteh, S. & Ibrahim, N. (2017). The Influence Factors to Academic Performance of Architecture Students in Malaysia. *Advances in Social Science, Education and Humanities Research. 102*: 306-308.

Higgins, S., Hall, E., Wall, K., Woolner, P. & McCaughey, C. (2005). The Impact of School Environments: A literature review. Newcastle: The Centre for Learning and Teaching, School of Education, Communication and Language Science, University of Newcastle.

Ibem, E., Alagbe, O. & Owoseni, A. (2017). A Study of Student's Perception of the Learning Environment: Case Study of Department of Architecture, Covenant University, Ota Ogun State. *Procs, INTED2017 Conference, 6-8th March*. 6275-6286. Valencia, Spain.

Lune, H. & Berg, B. L. (2017). Qualitative Research Methods for the Social Sciences 9th Edition. Harlow, Essex, UK: Pearson.

Maina, J. J. (2017). Informal space-use in formal learning environments: Case study of Architecture Department at Ahmadu Bello University. In S. Laryea & E. Ibem (Ed.), *Procs 7th West Africa Built Environment Research Conference, 16-18 August*. 930-944. Accra, Ghana: WABER.

Maina, J. J. (2018). Barriers to Effective Use Of CAD And BIM In Architecture Education in Nigeria. *International Journal of Built Environment and Sustainability*. 5(3): 175-186. DOI: 10.11113/ijbes.v5.n3.275.

Maina, J. J. & Aji, J. Y. (2017). Influence of Accommodation on the Academic Performance of Architecture Students. *Built Environmental Journal. 14*(2): 47-59.

Maina, J. J. & Dauda, A. (2017). Implications of Social Practices and Literacy on Wayfinding Design Strategies in Nigerian Hospitals. In S. Laryea & E. Ibem (Ed.), *Procs 7th West Africa Built Environment Research Conference, 16-18 August* . 870-885. Accra, Ghana: WABER.

Maina, J. J., Marafa, A. K. & Daful, C. K. (2018). Architecture Undergraduates Perception of factors affecting Academic Performance at Ahmadu Bello and University of Jos, Nigeria. *Journal of Environmental Spectrum. 2*(1): 18-30.

Masrek, M. N. & Zainol, N. Z. (2015). The Relationship between knowledge conversion abiliites and academic performance. *Procedia: Social and Behavioral Sciences (INTE 2014). 174*: 3604-3610. DOI:10.1016/j.sbspro.2015.01.1078.

Matthews, K. E., Andrews, V. & Adams, P. (2011). Social learning spaces and student engagement. *Higher Education Research and Development. 30*(2): 105-120. DOI:10.1080.07294360.2010.512629.

McCowan, T. (2014). *Can Higher Education Solve Africa's job Crisis? Understanding Graduate Employability in Sub Saharan Africa.* British Council. London: British Council.

McRobbie, C. J., Roth, W. M. & Lucus, K. B. (1997). Multiple Learning Environments In Physics Classrooms. *International Journal of Educational Research. 27*: 333-342.

Megahed, N. (2018). Reflections on studio-based learning: assessment and critique. *Journal of Engineering, Design and Technology. 16*(1): 63-80. DOI:10.1108/JEDT-08-2017.0079.

Mersha, Y., Bishaw, A. & Tegegne, F. (2013). Factors Affecting Female Students's Academic Achivement at Bahir Dar University. *Journal of International Cooperation in Education. 15*(3): 135-148.

Mustafidah, H. (2014). Analysis of Competence Level and the Attendance of the Lecturer in its Effects on Students Grade Using Fuzzy

Quantification Theory. Retrieved 20 December 2018 from arXiv preprint arXiv: 1409.3903

Mustaq, I. & Khan, S. N. (2012). Factors Affecting Students' Academic Performance. *Global Journal of Management and Business Research. 12*(9): 17-22.

Muzenda, A. (2013). Lecturer's competencies and Students' Academic Performance. *International Journal of Humanities and Social Science Invention. 3*(1): 6-13.

Oh, Y., Ishizaki, S., Gross, M. D. & Do, E. Y.-L. (2013). A theoritical framework of design critiquing in architecture studios. *Design Studies. 34*: 302-325. DOI:10.1016.j.destud.2012.08.004.

Oluwatayo, A. A., Aderonmu, P. A. & Aduwo, E. B. (2015). Architecture students' perceptions of their learning environment and their academic performance. *Learning Environments Research. 18* (2015): 129-142. DOI: 10.1007/s10984-015-9172-7.

Opoko, A. P., Oluwatayo, A. A. & Ezema, I. C. (2016). Factors Affecting Academic Performance of Architecture Students in Nigerian Private Universities. In O. J. Ebohon, D. A. Ayeni, C. O. Egbu & F. K. Omole (Ed.), *Procs, JIC 21st Century Habitat: Issues, Sustainability and Development, 21-24 March 2016* . 1226-1236. Akure, Nigeria: JIC.

Opoko, A., Alagbe, O., Aderonmu, P., Ezema, I. & Oluwatayo, A. (2014). Entry Qualifications and Academic Performance of Architecture Students in Building Structures. *Procs., EDULEARN14 Conference, 7-9 July* (pp. 1635-1641). Barcelona, Spain: EDULEARN.

Opoko, A., Oluwatayo, A., Ezema, I. & Ediae, O. (2015). Factors that affect Academic Outcomes of Architecture Students: Evidence from Selected Nigerian Schools of Architecture. *Procs, 8th International Conference of Education, Research and Innovation, 18-20 November 2015*. 8306-8314. Seville, Spain.

Osaikhiuwu, O. C. (2014). Institutional Factors Affecting the Academic Performance of Public Adminstration Students in a Nigerian University. *Public Administration Research. 3*(2): 171-177.

Owolabi, B. O. (2015). The Effects of Students' Housing in Academic Performance at the University of Ibadan in Nigeria. *International Journal of Scientific & Engineering Research. 6*(3): 1118-1132.

Prayoonwong, T. & Nimnuan, C. (2010). Dental students' perception of learning environment. *South-East Asian Journal of Medical Education. 4*(1): 49-54.

Ridzuan, A. R., Yunus, M. K., Abdullah, M. H., Bakar, M. H., Azlan, N. A. & Ramlan, A. F. (2018). The Relationship between Students' Satisfaction and their Academic Performance among Public Relations Degree Students in UiTM Alor Gajah Melaka. *International Journal of*

Academic Research in Business & Social Sciences. 8(10): 874-882. DOI: 10.6007/IJARBSS/v8-i10/4785.

Rugutt, J. K. & Chemosit, C. C. (2005). A Study of Factors that Influence College Academic Achievement: A Structural Equation Modelling Approach. *Journal of Educational Research & Policy Studies. 5*(1): 66-90.

Saghafi, M. R., Franz, J. & Crowther, P. (2012). Perceptions of physical versus virtual design studio education. *International Journal of Architectural Research. 6*(1): 6-22.

Salmi, H. & Thuneberg, H. (2019). The Role Of Self-Determination In Informal And Formal Science Learning Contexts. *Learning Environments Research, 22*: 43-63. DOI:10.1007/s10984-018-9266-0.

Simoes, F. & Alarcao, M. (2014). Mentors and Teachers: Testing The Effectiveness Of Simultaneous Roles On School Performance From A Basic Psychological Needs Perspective. *Intructional Science. 42*(3): 465-483. https://www.jstor.org/stable/43575239.

Sugahara, S. & Boland, G. (2014). How Accounting Students define Success And The Factors Affecting Their Success And Failure While Studying in the Accounting Schools in Japan. *Procedia-Social and Behavioral Sciences, 141*: 64-69. DOI: 10.1016/j.sbspro.2014.05.012.

Thomas, C. L., Pavlechko, G. M. & Cassady, J. C. (2018). An Examination Of The Mediating Role Of Learning Space Design On The Relation Between Instructor Effectiveness And Student Engagement. *Learning Environments Research*, DOI: 10.1007/s10984-018-9270-4.

Usman, M. T., Mukhtar, U. & Auwal, S. (2016). Parents Socio-Economic Status and Students Academic Performance in Nigeria Educational System. *International Journal of Education and Information Technology. 2*(3): 14-18.

Wu, Q. (2014). *Associations between Travel Behavior and the Academic Performance of University Students.* (Master Research Thesis in City and Regional Planning, Clemson University). South Carolina: Clemson University.

Zamberlan, L. & Wilson, S. (2015). Developing an embedded peer tutor program in design studio to support first year design students. *Journal of Peer Learning.* 8(1/3): 5-17. http://ro.uow.ed.au/ajpl/vol8/iss1/3.