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Architecture students' perceptions of their learning environment and their academic performance

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Abstract Scholars have agreed that the way in which students perceive their learning environments influences their academic performance. Empirical studies that focus on architecture students, however, have been very scarce. This is the gap that an attempt is filled in this study. A questionnaire survey of 273 students in a school of architecture in Nigeria provided data for this pilot study. The perceptions of the students were best defined by the involvement of the students in their studies, the perceived support, and conduciveness of the learning environment. The students' perceptions of their learning environment varied with their years of study, age and gender. Their perceptions of inflexibility of schedule, positive assessment, and fairness influenced the overall grades of students. The results suggests which aspects of learning environment that can be manipulated by architectural educators to improve the performance of their students. The study of the learning environment of architecture students still appears to be relatively unexplored. The value of this study therefore lies in its exploration of the perceptions of the learning environment from the point of view of students.

Keywords Academic performance · Architecture students · Learning environment · Perceptions

Introduction

The essence of architecture schools and indeed every department in institutions of learning is to impart relevant skills to their students. The education of architects combines theoretical knowledge and practice within the architectural studio. Teachers of architecture always aim at improving the quality of education given to the students. Researchers have stressed that one of the ways of understanding how students learn and their performances is

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by focusing on the learning environment (Prayoonwong and Nimnuan 2010). The reasons given for this are that the educational environment determines the success of curricula and the effectiveness of learning. Saghafi et al. (2012) put this more succinctly by noting that perceptions of the learning environment, rather than the objective learning environment itself, influence learning. This stance had earlier been taken by McRobbie et al. (1997) who stated that the achievement of students depends on how they perceive their classroom environments, as well as the psychosocial interactions which take place there. The environment in this context has often been referred to in the literature as the learning environment, which comprises teaching, teaching support and motivation (Bridgeland et al. 2006; Mayya and Roff 2004).

For architecture students, the studio is the learning space where they spend most of their time receiving instruction and interacting with lecturers and students. The architectural studio is a place for multiple interactions, which constitute the learning experience of students. The learning experiences of the students, however, can go beyond the studio. Similarly, motivation, as suggested by previous studies (Lueth 2008), might not just be external and, rather, it also could be internal. A previous study (Demirba 2001) suggests that the way in which students perceive their experiences within the architectural studio could determine the outcomes of their studies. In addition, it has been observed that architecture students with more positive outlooks about their studies and study environment tend to perform better, even though there is little empirical evidence to support this. In addition, it could be interesting to investigate if the perceptions of students vary with the year of study and gender. Very few studies have investigate the perceptions of this category of students of their learning environment.

The focus of this study was architecture students' perceptions of their study environment and how these perceptions influenced their academic performances. A study of this nature is important for providing teachers of architecture with necessary information on the aspects of the learning environment which are within their control and which can be manipulated to achieve better results. This study therefore addresses three questions. In what ways do students of architecture perceive their learning environment? Do students' perceptions vary with gender, age or year of study? Which dimension(s) of the perceptions differentiate poor, average and exceptional students in terms of their Cumulative Grade Point Averages (CGPAs)? The present study provided valuable information for architectural education, especially about the ways in which students' perceptions of learning environment influence their academic performances. Findings of this study could inform a review of the setting for the study of architecture and the curriculum.

Literature review

Students of architecture take a variety of courses varying from history and technology (structure, materials and building science) to design courses. They are expected to learn, understand and pass these courses to be qualified to practice. According to Hsu (1999), learning is an interactive process and product of student and teacher activity within a specified learning environment. Dochy et al. (2005) observed that learning, in the light of constructivist learning approaches, goes beyond transmission of knowledge. Rather, it is a process whereby students construct knowledge based on their perceptions, interpretations and actions. Such constructions of knowledge are often based on students' interactions with lecturers and peers and personal study activities. Specifically, Dochy et al. (2005) noted that it is not the instructional setting itself that matters, but the way in which students

interpret their learning environment that is an important determinant of their learning outcomes, including their performance (Demirbas 2001). This is probably because those interpretations form the basis for the responses of students. In other words, the ways students in which approach their studies depend on the ways in which they perceive their learning context, which in turn influence their academic performances.

The learning of architecture takes place mostly in the studio. Lueth (2008) defined the studio as a workspace where students explore a set of skills with or without the presence of an instructor. It is a place where students are listened to, with their ideas being clarified and deliberated upon as they learn how to design. The architectural studio is a place both for instruction and for high-level social interaction among students and between students and lecturers (Degregori 2007). Lueth (2008) further noted that the architectural studio is also a place for the diverse daily activities of architecture students. Students do not only receive lectures in the studio, but also they carry out assignments and studio projects there. The implication of this is that the studio is a place for varying and continual interaction where architecture students spend most of their time (Demirbas 2001). It is within this environment that students develop meaning for their learning. The learning environment for architecture goes beyond just the studio space and comprises all activities and interactions that promote teaching and learning within the space. Frenzel et al. (2007) noted that students' perceptions of their learning setting have been associated with many outcomes including academic grades.

The place of perceptions of learning environment in learning outcomes has been well researched by Frenzel et al. (2007). Lizzio et al. (2002) investigated five dimensions of students' perceptions of the learning environment in a questionnaire that they called the Course Experience Questionnaire (CEQ). These dimensions were identified as good teaching, clear goals, assessment, workload and independence and they have been popularly investigated in learning environment studies. Very little, however, is known about architectural students who combine learning of theory and practice within the study environment. As earlier noted, the social aspect of learning is very important in architectural education (Degregori 2007). Njhuis (2006) observed that the CEQ did not pay attention to the social aspects of learning, suggesting that further studies should take into account peer learning. It is obvious that architectural educators might not be able to do much to improve the performance of their students and overall quality without knowledge of the aspects of the perceptions of students that influence their performance. Furthermore, the CEQ suggests that perceptions of the learning environment could be related to the space and effectiveness of the teaching process.

The performance of the students is the measure of learning accomplishment. This is often reflected in the grades of the students. A major form of assessment for architecture students is the design jury. This is often because design is a major course taken which occupies most of the lecture hours of the students. Anthony (1991) argued that students often see these juries as places for harsh judgement. Students are also often assessed by self-evaluation and peer review as recommended by UIA/UNESCO (1996). Theoretical courses are assessed by the lecturers based on the course curriculum. Within the university environments, all the grades for courses taken by each student for the semester are often computed as Grade Point Averages (GPA). In the university under study, all scores are out of 100. Scores below 45 attract no points, scores between 45 and 49 attract 2 points, 50–59 attract 3 points, 69–60 attract 4 points and scores 70 and above attract 5 points. This is aggregated into CGPA for all the semesters for which students have sat for examinations. Students with GPAs lower than 1.5 are categorised as failed students, while those with averages 1.5–2.49 are categorised as third-class students. Other categories are 2.5–3.49

CGPA (second-class lower division), 3.50–4.49 (second-class upper division) and 4.5 and above (first class). Scholars have suggested that the overall grades of students are influenced by the ways in which they perceive their learning environment.

Some empirical studies exist in this area, such as Lizzio et al. (2002). In their study of 2130 students from 14 faculties at Griffin University, they found no gender differences in the perception of students and their learning environments. They also found positive associations between perceptions of workload and students' GPA. Students who perceived lower workloads performed better. One reason given by the authors for this is that such students might be able to manage their workloads more effectively than those who perceived that their workloads are too high. In the same study, perceived good teaching also was associated with better performance among students. In fact, it had the strongest direct influence on the performance of students.

In another study, Mayya and Roff (2004) investigated perceptions of the learning environment among medical students at Kasturba Medical College. High achievers in that study had more positive perceptions of teaching, academic atmosphere and social self than under-achievers. Social self in this context was how the students perceived their uniqueness and peculiarity within the classroom setting. Gender was also a factor which was found to influence the ways in which students perceived their educational environment. Mayya and Roff (2004) found that male high achievers were less bored with the course than female high achievers. In addition, male high achievers perceived that teachers got less angry. This appears contrary to the findings of Prayoonwong and Nimnuan (2010). In their study of pre-clinical dental students in Naresuan University, they did not consider the achievement levels of the students, but they found no significant differences between males and females in their perceptions of their learning environments. Their findings, on the other hand, indicated that there were significant differences in the perceptions of students based on their year of study.

Most of the studies of architectural education concentrated on learning styles (Demirba 2001; Kvan and Jia 2005). There is little empirical evidence about the perceptions of architectural students of their learning environment, whether and how these vary with the class level or gender of the students, and how they affect the academic performance of students. Our study attempted to fill this gap in the literature.

This study hypothesised that perceptions of the learning environment would be influenced by the age, gender and years of study of the students. These attributes of the students also were anticipated to influence the academic performance of the students in terms of their overall grades. In addition, students' perceptions of their learning environment also were expected to influence their performance.

Research methods

A closed-ended questionnaire was developed by the researchers to incorporate the social aspects of learning. The closed-ended questionnaire approach was adopted because it gives a uniform basis for comparison of responses. It consisted of three parts. The first part of the questionnaire gathered information on the level of study, gender and age of students. In the second part, students were asked to indicate their average lecture hours, class size, semester credit load and CGPA after the last examination. The perceptions of the students of their study environment were the focus of the third section of the questionnaire (Table 1). The students were asked to indicate their levels of agreement with questions that bordered on their perceptions of the learning environment in terms of

Table 1 Variables for perception of learning environment

Student perception	Variables
Perceived quality of instruction	I have access to textbooks which help me learn better
	The nature of my department's curriculum does not give room for students to take courses in other fields
	I can relate with what I am taught in class because it is practical
	I feel I am part of every lecture, so I can help decide how the lecture goes by my contributions
	My lecturers are competent to take their courses
	I can easily ask for clarifications on areas of a lecture I do not understand
	The assignments given by my lecturers help me understand architecture better
	I have a choice in the kind of assignment I get involved in
	I have the lecture notes which greatly help me learn
Academic atmosphere	I am satisfied with the size of my class and my classroom is organized
	My timetable is adequately spaced to allow me to assimilate one lecture before another is taken
	The facilities available in the classroom aid my learning
	Other activities often reduce the time I have left to spend on my studies
	Some of my lectures are time-wasting
Friendship and student communities	Being in class with other students helps me learn better
	I help other students with their problem areas in their studies
	I discuss lectures with other students
	I learn a lot from my course mates
	The student body (SAS) gives good support to my academic pursuit
	I learn from other students' mistakes
Student–lecturer interaction	My relationship with my tutors is very cordial
	My lecturers encourage me a lot
	I get good advice from my lecturers
	My lecturers are sometimes unfair
	I relate well with my lecturers
	My lecturers advise on non-academic issues
	My lecturers only assist me when I ask for their assistance
	I interact with my lecturers outside the classroom
	My lecturers do not like me
	My lecturers are excited about the profession
	I am free to express my disagreement with a lecturer's point of view
Assessment	The tests given are always based on lectures already received
	Juries organised in my school are harsh
	Tests are administered at intervals that help my overall performance
	The grading system used by my lecturers is fair
	The quality of teaching and learning in my school can take me through practice for years

the quality of instructions, academic atmosphere, self, friendship and student communities. A Likert scale of 1–5 was adopted, where one (1) refers to Strongly Disagree and five (5) for Strongly Agree.

The questionnaires were administered by the researchers in a cross-sectional survey of the students of architecture in Covenant University, Ota, Ogun State, Nigeria, in June 2012. The entire student population of 340, which represented students at all levels of the department, was taken as the study sample, but only 273 students responded to the questionnaire (representing a response rate of 80.2 %). This is because the population size was not high. In addition, all of the students were easily accessible because they were all in one location. These students were spread over the four undergraduate years and the two postgraduate (Masters) years.

The alpha level was set at 0.05 for all statistical tests. Data were analysed using Statistical Package for Social Sciences (SPSS), version 17. The data on respondents profiles were analysed using descriptive statistics. Principal components analysis was utilised to obtain the main dimensions that describe students' perceptions of their learning environments. To investigate the variance in students' perceptions according to age, gender and year of study, analysis of variance was carried out. Regression analysis was used to determine the demographic and perception factors which influenced the academic performance of the students.

Results

A large majority of the respondents in the study were in the second and third years of their studies (Table 2). Males aged 17 years and above accounted for the majority of the respondents. When Cronbach's alpha test was carried out to investigate the reliability of the 50 items used in measuring perceptions of the learning environment, a value of 0.80, which according to George and Mallery (2003) is acceptable, was obtained.

Principal component analysis revealed that 12 factors described the perceptions of the students of their learning environment (Table 3). These factors accounted for 62 % of the variance in data. The first factor, which accounted for 13 % of the variance, represented the

Table 2 Profile of respondents

Demographic variable	Subgroup	Percentage
Gender	Male	67
	Female	33
Age of student	14–16	9
	17–19	48
	20–21	26
	Above 21	18
Level of study	100 Level	19
	200 Level	23
	300 Level	22
	400 Level	18
	MSc I	10
	MSc II	7
Cumulative Grade Point Average (CGPA) last semester	1.50–2.49	3
	2.50–3.49	58
	3.50–4.49	26
	4.50–5.00	12

Source: Field Survey (2012)

Table 3 Factors of study environment perception

Factors (% variance)	Item	Component score
Factor 1: involvement of students (13 %)	I discuss lectures with other students	0.76
	I learn from other students' mistakes	0.75
	Being in class with other students help me learn better	0.71
	I learn a lot from my course mates	0.68
	I help other students with their problem areas in their studies	0.66
	I have the lecture notes which greatly help me learn	0.57
	I can easily ask for clarifications areas of a lecture I do not understand	0.54
	My lecturers are excited about the profession	0.53
Factor 2: perceived support (8 %)	My relationship with my tutors is very cordial	0.74
	I relate well with my lecturers	0.68
	I feel I am part of every lecture, so I can help decide how the lecture goes by my contribution	0.55
	My lecturers encourage me a lot	0.52
	The student body (SAS) gives good support to my academic pursuit	0.45
Factor 3: conduciveness of learning environment (6 %)	My classroom is organised	0.85
	I am satisfied with the size of my class	0.77
	The class environment aided my learning	0.55
Factor 4: comprehensiveness of instruction (5 %)	My department networks with other educational stakeholders outside the school	0.77
	The quality of teaching and learning in my school can take me through practice for years	0.56
	My lecturers advise me with non-academic issues	0.50
Factor 5: inflexibility of schedule (5 %)	The nature of my department curriculum does not give room for students to take courses in other fields	0.70
	My lecturers only assist me when I ask	0.52
	Other activities often reduce the time I have left to spend on my studies	0.51
	Juries organized in my school are harsh	0.42
Factor 6: & uninspiring tutoring (4 %)	My lecturers are sometimes unfair	0.75
	Some of my lectures are time wasting	0.51
	My lecturers do not like me	0.50
Factor 7: facilitated learning (4 %)	My timetable is adequately spaced to allow me to assimilate one lecture before another is taken	0.61
	My lecturers are competent to take my courses	−0.54
	The facilities available in classrooms aid my learning	0.43
	I have a choice in the kind of assignment I get involved in	0.42
Factor 8: positive assessment (4 %)	The assignments given by my lecturers help me understand architecture better	−0.82

Table 3 continued

Factors (% variance)	Item	Component score
	The grading system used by my lecturer is fair	0.52
Factor 9: practicability (4 %)	I can relate with what I am taught in class because it is practical	0.78
	I have access to textbooks which help me understand my lectures	0.33
Factor 10: counsel (3 %)	I get good advice from my lecturers	0.80
Factor 11: fairness (3 %)	The tests given are always based on lectures already received	0.81
Factor 12: extended learning setting (3 %)	I interact with my lecturers outside the classroom.	0.72

Source: Field Survey (2012)

involvement of students. Accounting for 8 % of the variance in the data, the second factor represented the level of perceived support from tutors and other students. The third, fourth and fifth factors represented the conduciveness of the study environment (6 %), the comprehensiveness of instruction (5 %) and the inflexibility of the schedule (5 %), respectively. Other factors that defined the perceptions of students of their study environments are uninspiring tutoring (4 %), facilitated learning (4 %), positive assessment (4 %) and practicability of learning (4 %), as well as counsel (3 %), fairness (3 %) and extended learning setting (3 %).

Analyses of variance were carried out to determine if the perceptions of students varied with their year of study, age and gender. The factor scores for perceptions of the learning environment for each of the students were entered as dependent variables in each analysis. The mean score for each factor was zero because the factors were standardised during principal component analysis. The F statistics in Table 4 indicate the variance in learning environment perceptions explained by the year of study, age and gender. When year of study was used as a factor, the F statistic was significant for involvement of students ($F_{(5,263)} = 3.21$, $\eta^2 = 0.06$, $p = 0.008$), perceived support ($F_{(5,263)} = 2.58$, $\eta^2 = 0.05$, $p = 0.027$), conduciveness of learning environment ($F_{(5,263)} = 16.8$, $\eta^2 = 0.24$, $p = 0.000$) and comprehensiveness of instruction ($F_{(5,263)} = 5.62$, $\eta^2 = 0.10$, $p = 0.000$). Other factors that varied with the year of students were perceptions of inflexibility of schedule ($F_{(5,263)} = 5.16$, $\eta^2 = 0.09$, $p = 0.000$), facilitated learning ($F_{(5,263)} = 6.79$, $\eta^2 = 0.11$, $p = 0.000$) and positive assessment ($F_{(5,263)} = 8.63$, $\eta^2 = 0.14$, $p = 0.000$). The ANOVA effect sizes suggest that the year of study had medium and large effects ($\eta^2 > 0.059$) (Cohen 1988) on all of the learning environment scales, except perceived support for which the level of study had a small effect. In fact, the year of study had the largest effect on perceptions of conduciveness of the learning environment.

The means and standard deviations are presented in Table 4, which shows that students perceived the highest levels of involvement and comprehensiveness of instruction during the first year of their studies. However, there was a reduction in perceptions of the levels of these factors in subsequent years. The levels of perceived inflexibility of schedule and positive assessment were also low for Master Architecture students in the study, but high for undergraduate students. This can be deduced from the results in Table 4 because the mean score for inflexibility of schedule was highest for 100-level students ($M = 0.50$, $SD = 0.98$) but lowest for MSc II students ($M = 0.04$, $SD = 1.26$). In comparison, scores for perceived

Table 4 Mean differences on learning environment perception factors by year of study, age and gender of students

Variable	Subgroup	Involvement of students		Perceived support		Conduciveness of learning environment		Comprehensiveness of instruction		Inflexibility of schedule		Facilitated learning		Positive assessment	
		M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Year of study	100 Level	0.31	0.96	0.00	0.76	0.29		0.55		0.50		−0.53	1.41	0.20	0.59
	200 Level	0.22	0.88	−0.04	1.02	−0.74	0.91	−0.08	0.86	0.20	0.80	−0.05	0.81	−0.10	0.58
	300 Level	−0.32	1.31	−0.20	1.08	−0.20	1.15	−0.29	1.07	0.03	1.07	−0.07	0.76	0.07	0.52
	400 Level	0.01	0.68	−0.07	1.15	0.32	0.69	−0.25	1.11	0.39	0.71	0.22	0.98	0.29	0.55
	MSc I	−0.18	0.86	0.57	0.69	0.36	0.98	0.05	1.12	0.04	1.26	0.50	0.68	0.06	0.70
	MSc II	−0.10	0.51	0.24	0.94	0.89	0.49	0.25	0.45	−0.21	1.03	0.58	0.56	−1.24	1.81
F value		3.21*		2.58*		16.80*		5.62*		5.16*		6.79*		8.63*	
Student age	14–16	0.26	0.74			0.30	0.68	0.41	1.05	−0.38	1.17	−0.52	0.79	0.24	0.63
	17–19	0.12	1.05			−0.19	1.04	−0.13	1.01	−0.04	0.97	−0.14	0.78	0.05	0.54
	20–21	−0.10	0.86			0.03	1.02	−0.06	1.07	0.36	0.69	0.24	1.04	0.08	0.62
	Above 21	−0.29	0.98			0.40	0.83	0.32	0.71	0.16	1.22	0.32	0.67	−0.41	2.04
F value		5.42*				4.17*				4.76*		4.71*		2.49*	
Student gender	Male							0.13	0.89						
	Female							−0.27	1.15						
F value								9.95*							

* $p < 0.005$

Source: Field Survey (2012)

support, conduciveness of learning environment, and facilitated learning were highest for the Masters classes but lowest for the students in the early years of their training. For instance, Table 4 shows that the mean scores of the Masters students for perceived support were $M = 0.24$, $SD = 0.94$ and above, while those for undergraduates were lower. Similarly, the scores of the Masters students for conduciveness of the learning environment were $M = 0.36$, $SD = 0.98$ and $M = 0.89$, $SD = 0.49$ for MSc I and MSc II, respectively, while those for undergraduates were lower. The same also goes for facilitated learning.

Perceptions of involvement ($F_{(1,269)} = 5.42$, $\eta^2 = 0.08$, $p = 0.000$), conduciveness of learning environment ($F_{(1,269)} = 4.17$, $\eta^2 = 0.06$, $p = 0.003$) and comprehensiveness of instruction ($F_{(1,269)} = 3.24$, $\eta^2 = 0.05$, $p = 0.013$) varied with the ages of the students. Other learning environment perception factors that varied with the ages of the students were inflexibility of schedule ($F_{(1,269)} = 4.76$, $\eta^2 = 0.07$, $p = 0.001$), facilitated learning ($F_{(1,269)} = 4.71$, $\eta^2 = 0.07$, $p = 0.001$) and positive assessment ($F_{(1,269)} = 2.49$, $\eta^2 = 0.04$, $p = 0.044$). The effect of the age of the students was small for the perceptions of comprehensiveness of instruction and positive assessment, according to Cohen's (1988) rule of thumb ($\eta^2 < 0.059$). No large effect of age on perceptions of learning environment was observed. The results also show that the students between 14 and 16 years old perceived higher involvement ($M = 0.26$, $SD = 0.74$) and more positive assessment ($M = 0.24$, $SD = 0.63$) than older students. Older students (above 21 years), on the other hand, indicated perceptions of higher conduciveness of study environment ($M = 0.40$, $SD = 0.83$) and facilitated learning ($M = 0.32$, $SD = 0.67$) than younger students. It is interesting, however, to note that the mean score for conduciveness for students aged between 14 and 16 years ($M = 0.30$, $SD = 0.68$) was higher that for students aged between 17 and 21 years. The mean score for inflexibility of schedule was highest for students between 20 and 21 years ($M = 0.36$, $SD = 0.69$) and lowest for students aged between 17 and 19 years ($M = -0.19$, $SD = 1.04$). It is also interesting to note that the youngest ($M = 0.41$, $SD = 1.05$) and the oldest ($M = 0.32$, $SD = 0.71$) students had the highest mean scores for perception of comprehensiveness of instruction.

When gender was entered as a factor, only perceptions of comprehensiveness of instruction varied significantly ($F_{(1,269)} = 9.95$, $\eta^2 = 0.04$, $p = 0.002$), although the effect was small. Generally, male students ($M = 0.13$, $SD = 0.89$) indicated perception of higher conduciveness in the learning environment than did female students ($M = -0.27$, $SD = 1.15$).

Another question that was addressed in this study was which student demographic characteristics and which study environment scales were most closely associated with the differences observed in the overall grades (CGPA) and the proportion of variance that was explained by each factor. Different categorical regression analyses were thus carried out to establish these relationships. The CGPAs were entered as the dependent variables. The influence of the age of the students was significant ($b = -0.32$, $F_{(1,271)} = 3.89$, $p = 0.008$), accounting for 8 % of the variance in performance ($R^2 = 0.08$, $f^2 = 0.08$, $F_{(3,273)} = 3.84$, $p = 0.002$). A closer look at the data showed that the younger students performed better than older students.

The object scores obtained for perceptions of the learning environment were also entered as independent variables in the categorical regression analysis. Perceptions of inflexibility of schedule ($b = 0.16$, $F_{(1,271)} = 3.70$, $p = 0.026$), positive assessment ($b = -0.24$, $F_{(1,271)} = 5.91$, $p = 0.001$) and fairness ($b = -0.21$, $F_{(1,271)} = 3.70$, $p = 0.031$) were the learning environment perception factors which most influenced students' academic performances (Table 5). These accounted for 22 % ($R^2 = 0.22$, $f^2 = 0.28$, $F_{(3,267)} = 1.99$ $p = 0.002$) of the variance in the academic performance of the students.

Table 5 Results of regression analysis

Independent variables	Standardized beta	*p*	*F*	R^2	*F*	*p*
Students' demographic characteristics						
Year of study	0.10	0.792	0.25	0.08	3.84	0.002
Gender of student	−0.06	0.452	1.77			
Age of student	−0.32	0.008**	3.89			
Perceptions of learning environment						
Involvement of students	−0.06	0.747	0.29	0.22	1.84	0.002
Perceived support	−0.08	0.745	0.23			
Conduciveness of learning environment	0.07	0.722	0.33			
Comprehensiveness of instruction	−0.13	0.342	1.12			
Inflexibility of schedule	0.16	0.026*	3.70			
Uninspiring tutoring	−0.17	0.071	2.38			
Facilitated learning	−0.17	0.053	2.59			
Positive assessment	−0.24	0.001*	5.91			
Practicability	0.10	0.576	0.55			
Counsel	0.10	0.480	0.87			
Fairness	0.21	0.031*	2.71			
Extended learning setting	−0.14	0.308	1.21			

* $p < 0.05$; ** $p < 0.01$

Source: Field Survey (2012)

Specifically, students who indicated perceptions of low inflexibility of schedule recorded poorer performance than those who perceived high inflexibility of schedule. This suggests that the higher the level of flexibility of schedule, the poorer the performance of the students in the study. It is also surprising that the students who indicated perceptions of high fairness recorded poorer performance than students who perceived lower of fairness. On the contrary, students with perceptions of positive assessments recorded better grades than those who perceived assessments as more negative.

Discussion and conclusion

The results suggest that perceptions of the learning environment in architectural education are related to the space and effectiveness of the teaching process, as suggested previously by Lizzio et al. (2002). This is because the conduciveness of the learning environment is related to the space, while all other factors except perceived support appear to be related to the effectiveness of the teaching process. Perceived support appears to be an additional dimension which probably suggests the peculiarity of the training of architecture. This could be an indication that students need to identify or connect with both tutors and the student body in their course.

It is also interesting to note that the factor which best defined the perceptions of the students of their learning environment was involvement. This could suggest a yearning of the students to be involved in their training. It is also probably a fallout of the aim of university education to make students knowledgeable in their own rights. One therefore

might say that the students are not just interested in receiving instruction; they also prefer to be part of the creation of knowledge, which could have implications for architectural education. This is in the light of the fact that this came ahead of even the conduciveness of the learning environment and other factors that represented the effectiveness of the teaching process.

It is not clear why architecture students in the first year of their studies felt that they were more involved and that the instruction was more comprehensive than did students at other levels. It is possible that, during the first year, students were still fresh. In addition, many of the courses taken at that level are continuations of their basic learning in secondary school. As a result, students might have found it easy to understand and participate in the classes. From the second year, students of architecture begin to take specialised courses in the field. Being new to this field could be the reason why they probably felt less involved and perceived that instruction was less comprehensive. This could suggest a need for architectural educators to find more practical and comprehensive ways of passing across new knowledge at all levels of the study of architecture that motivate students to be more involved. This is because, as noted earlier, learning is not just transmission of knowledge, but also a construction of knowledge by individual students.

The Masters Architecture students also indicated higher perceived levels of support from their tutors and the student body, facilitated learning, and conduciveness of the learning environment than the undergraduates. This probably suggests that students get more comfortable with their studies as they approach professional degree acquisition. It is also possible that, having been part of the department for four to five years, they have adapted to prevailing conditions and might not complain. Personal observation of the students' learning spaces, however, showed that the studio for the Masters students appears more ergonomically adequate and has provisions for both manual and electronic drafting. The seats also appear to be more comfortable and the studios are air-conditioned. In contrast, the undergraduate studios are not air-conditioned and the seats are less comfortable, according to students. What this suggests is that architecture schools might need to pay more attention to the facilities that they provide for their students. Where possible, students also might be carried along in providing such facilities.

The fact that the results of the study show that final-year Masters Architecture students indicated the lowest level of positive assessment is a point to be noted by architectural educators. The reasons for this are not clear and could be a subject for further studies. It is possible that the basis for the measurement of the learning of these students is not clear to them. The students might want to be well informed about the benefits of assignments and the basis for their assessments. Students in earlier years of study also might have come into the department with open minds. They therefore might not have formed their own opinions about assignments and grading. The Masters students also recorded the lowest level of inflexibility of schedule. A look at the architecture curriculum of the school investigated reveals that, while undergraduates took between 11 and 13 courses in a semester, the number of courses take by the postgraduate students ranged from 4 to 7. It hence could be expected that students who take more courses would have tighter schedules. In addition, the university under study is a mission University, which mandates that all undergraduate students attend certain events, where attendance by postgraduate students is not compulsory.

The fact that older students also indicated higher conduciveness of the learning environment and facilitated learning might be explained by the fact that these older students could be rounding up their architectural education. As such, the explanation given for the year of study above could suffice. By Nigerian educational standards, the minimum official age to gain admission into secondary school is 10 years. Therefore, an average student in

the university is expected to have gained admission between 16 and 17 years of age. As such, at 21, such students could be in the first or second year of the Masters programme. The explanation for the observed perceptions of low involvement, inflexibility of schedule and positive assessment also might be similar to that given for the year of study.

The results further suggest that only the students' perceptions of the conduciveness of their learning environments varied by gender, which appears to contradict the findings of Lizzio et al. (2002) and Prayoonwong and Nimnuan (2010) who reported no significant differences between males and females in terms of their perceptions of their learning environments. This result corroborates the findings of Mayya and Roff (2004), who found gender differences in learning environment perceptions. However, gender differences were not in terms of boredom as found by Maya and Roff, but in terms of perceptions of the conduciveness of the learning environment. This variation could be linked to the physiological differences between male and female. The terms with which the students described the conduciveness of their learning environment included the sizes and organization of their classes. There could be a need for further studies to investigate appropriate sizes and organisations of architectural studios, as well as the preferences of students of different genders.

The fact that younger students in the study recorded better overall grades could be because most of the younger students are still in the earlier years of their studies and have not taken as many courses in the department as the older students. One cannot conclude that younger students perform better. This is because it could be necessary to compare students at the same level to reach this conclusion. As suggested by Principe (2005), perceptions of the learning environment influence students' academic performance. Specifically, the perceptions of inflexibility of schedule, positive assessment and fairness significantly influenced the academic performance of students. It appears that, when architecture students in the study were faced with tight schedules, they obtained better grades than when their schedules were flexible. What this probably suggests is that tight schedules could help students to maintain focus and come up with better grades. This might need to be further investigated.

One would have expected that students who perceive that their assessments were positive would record better grades. The results, however, showed the contrary. One reason for this could be that students who always believe that they deserve better grades could be propelled to work harder and earn better grades, while those students who perceive high positive assessment feel no need to put in extra effort and thus obtained lower grades in the different courses.

The findings of this study seem to be different from those of Lizzio et al. (2002) because perceived good teaching, which is represented in this study by comprehensiveness of instruction, was not a significant predictor of the academic grades of architecture students. The variance in performance accounted for by perception factors was also lower, with the percentage obtained in this study being 21.5 % compared to 28 % reported by Lizzio, Wilson and Simons. A reason for this could be that the contexts are different. It also might suggest the peculiarity of architectural education, which needs to be further investigated.

The perceptions of architecture students of their learning environment had hitherto received little attention in the literature. Findings from this study suggest that the perceptions of architecture students of their learning environment are not just limited to the space and effectiveness of the learning environment as suggested in previous studies, but also encompass perceptions of support from tutors and the student body. This aspect could be very important to the study of architecture because of the high-level social interaction that characterises architectural study. The findings of the study provide empirical evidence for the influence of year of study, age and gender on perceptions of architecture students'

learning environment. This study identified aspects of the learning environment which architectural educators and proprietors can use in improving the performances of their students. More inflexible schedules and stringent assessments might appear unfair, but these are avenues for architectural educators to ensure better grades for their students. However, there is a need to further investigate this in other architecture schools.

There are certain limitations to this study. Firstly, samples were taken from only one architectural school in Nigeria. Although this could provide a uniform setting for all students, the findings cannot be generalised because the contexts in other architectural schools could differ. A wider study might be required to reach such generalisations. Secondly, the cross-sectional nature of the study did not permit the investigation of cause–effect relationships. It would be interesting to investigate how the perceptions of individual students of their learning environment change when their grades change.

References

Anthony, K. A. (1991). *Design juries on trial: The renaissance of the design studio*. New York: Van Nostrand Reinhold.

Bridgeland, J. M., Dilulio, J. J., & Morison, K. B. (2006). *The silent epidemic: Perspectives of high school dropouts*. Washington, DC: Civic Enterprises.

Cohen, J. (1988). *Statistical power analysis for behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

DeGregori, A. (2007). *Learning environments: Redefining the discourse on school architecture*. Unpublished MSc thesis, New Jersey Institute of Technology.

Demirba, O. O. (2001). *The relation of learning styles and performance scores of the students in interior architecture education.* Unpublished Doctor of Philisophy thesis, Bilkent University.

Dochy, F., Seger, P., Van Den Bossche, P., & Struyven, K. (2005). Students' perception of problem-based learning environments. *Learning Environments Research, 8*, 41–66.

Frenzel, A. C., Pekrun, R., & Goetz, T. (2007). Perceived learning environment and students' emotional experiences: A multilevel analysis of mathematics classrooms. *Learning and Instruction, 17*, 478–493.

George, D., & Mallery, P. (2003). *SPSS for windows step by step: A simple guide and reference. 11.0 Update* (4th ed.). Boston: Allyn & Bacon.

Hsu, C. H. C. (1999). Learning styles of hospitality students: Nature or nurture? *Hospitality Management, 18*, 17–30.

Kvan, T., & Jia, Y. (2005). Students' learning styles and their correlation with performance I: Architectural design studio. *Design Studies, 26*(1), 19–34.

Lizzio, A., Wilson, K., & Simons, R. (2002). University students' perceptions of the learning environment and academic outcomes: Implications for theory and practice. *Studies in Higher Education, 27*(1), 27–52.

Lueth, P. L. O. (2008). *The architectural studio as a learning environment: A qualitative exploration of architecture design student learning experiences in design studio from first through fourth year.* Unpublished PhD dissertation, Iowa State University.

Mayya, S. S., & Roff, S. (2004). Students' perceptions of educational environment: A comparison of academic achievers and underachievers at Kastaba Medical College, India. *Education for Health, 17*(3), 280–291.

McRobbie, C. J., Roth, W. M., & Lucus, K. B. (1997). Multiple learning environments in physics classroom. *International Journal of Educational Research, 27*, 333–342.

Njhuis, J. F. H. (2006). *Learning strategies, students' characteristics, and their perception of the learning environment: An integrated study among business students.* Unpublished PhD dissertation, Universiteit Maastricht. Retrieved September 10, 2012. http://arno.unimaas.nl/show.cgi?fid=6488.

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

Principe, H. R. (2005). *Factors influencing students' academic performance in the first accounting course: A comparative study between public and private universities in Puerto Rico.* Unpublished Doctor in Business Administration, Argosy University.

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.

UIA/UNESCO. (1996). *Charter for architectural ed*ucation. Retrieved September 10, 2012. www.unesco.org/most/uiachart.htm.