Architecture Curriculum on Final Year Students' Design: Do Gender and Mode of Entry Matter?

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Abstract

Curriculum evaluation being fundamental to sustenance of quality standards of education, this study presents an evaluation of the architecture curriculum, not reviewed since its implementation in 2012 at Ahmadu Bello University Zaria. Specifically, the paper presents the student perspective regarding the impact of courses on design, employing Likert scale ratings of the courses in the new curriculum. Results were analyzed using SPSS v.21 for descriptive statistics as well as Mann-Whitney and Kruskal-Wallis tests for differences in course ratings along two variables, gender and mode of entry. Results reveal that practical courses such as SIWES, Building Construction, CAAD, Sustainability and Architecture, amongst fourteen courses, highly impact design in the final year class. Overall, departmental electives (M 3.71) were rated more highly than theoretical cognate courses (M 3.61) designed to complement core courses (M 4.34) in the architectural curriculum. Additionally, gender and mode of entry on average had no significant influence on ratings of courses highly impacting design. The study recommends frequent evaluations, reduction on credit hours for the final year class, a paradigm shift from traditional teaching styles to outcome-based educational systems, attracting funding for practical site visits, encouraging students to become proactive learners as well as boosting female students' morale towards design and creative programs.

Keywords: *Architecture, Curriculum, Design, Gender, Mode of Entry*

Introduction

Higher Education (HE) in Nigeria has been intensely criticized in recent years over the increasing inability of graduates to perform basic tasks expected of graduate education and training (Duze, 2011; Idogho, 2011; Akinnaso, 2012; Sodipo, 2014; Ajake, Oba, & Ekpo, 2014; Muhammad, 2015). This observation has also been noted for architecture education, and by implication the architecture curriculum (Tzonis, 2014). In architecture, this trend has been attributed to several reasons. They include the enormous complexity of our economies and societies; curricula based on abstract theories of learning and standard pedagogical formulas of university education often ignoring realities of architectural practice (Salama, 2008; Tzonis 2014).

Other reasons proffered for the decline in quality of architecture graduates are changing desires and aspirations of clients seeking sustainable buildings, global depletion of resources as well as "the explosion of differentiation and specialization of architecture knowledge division of labor in architectural practice as a result of technological, epistemological, economic and social forces demanding a place in the curriculum" (ibid: 478). In response, gradual modifications by adding or removing courses have been made in the curriculum, which though important, have been partially adequate in addressing the current state of architecture education (ibid).

Studies have emerged in recent years evaluating areas of architecture curriculum and education. Specifically, these studies focus on student performance (Afolami, Olotuah, Fakere & Omale, 2013; Opoko, Oluwatayo, Ezema, & Ediae, 2015; Opoko, Oluwatayo, & Ezema, 2016; Maina & Aji, 2017), architecture education, practice and design (Alagbe, Aderonmu, Opoko, Oluwatayo, & Dare-Abel, 2014; Dare-Abel, Alagbe, Aderonmu, Ekhaese & Adewale, 2015; Doyle & Senske, 2016), professional competence of architecture graduates (Maina & Salihu, 2016; Maina & Daful, 2017; Dalibi, 2017), entry qualifications (Adewale & Adhuze, 2013), gender issues in architecture education (Barkul & Ayyildiz Potur, 2010; Niculae, 2012; Rokooei & Goedert, 2014; Musa & Saliu, 2016) as well as curriculum reforms in architecture education (Abdulkarim 2011; Revised Programmes, 2012). Recommendations from the last set of studies were influential in revising the architecture curriculum at Ahmadu Bello

University (ABU) in 2012 to what is currently being implemented.

The modified curriculum has however not been evaluated. Additionally, little or no formal feedback exists on how courses taken as part of the curriculum impact design in the Architectural Design Studio (ADS) from the student perspective. This is especially important for at least three reasons. First, the architecture curriculum is organized around design taught in the design studio (Ibrahim and Utaberta, 2012; Bashir, Ahmad, & Hamid, 2013; Bashier, 2014; Nazidizaji, Tome & Regateiro, 2014; Hedges, 2014; Doyle & Senske, 2016; Raisbeck, 2016). Feedback from students who are trained by the curriculum is necessary if improvement and progress is to be made in educating future architects. Secondly, periodic evaluation of curricula is an important task of schools and a requirement for accreditation (Agboola & Elinwa, 2013). Thirdly, studies reporting curriculum evaluation from the student perspective are rare in architectural research.

The study was conducted at the Department of Architecture in ABU, Zaria, being the pioneer School of Architecture in Nigeria. The 400L class (final year, 2014/2015 session) was selected because it is the first set of undergraduate students trained by the revised curriculum. The present curriculum was revised in 2012 following recommendations accruing from observed lapses in the former curriculum (Abdulkarim 2011; Revised Programmes, 2012).

To this end, the study poses three research questions: First, which courses in the undergraduate architecture curriculum most impact design from the final year student perspective? Second, are there differences in ratings for impact on design between categories of courses that are core, cognate and electives? Third, are there differences in ratings for the most impactful courses on design based on gender and mode of entry? These last two variables have been a recurring factor in issues regarding academic performance of architecture students in recent studies (Barkul & Ayyildiz Potur, 2010; Abdulkarim, 2011; Adewale & Adhuze, 2013; Bicer, 2013; Rokooei & Goedert, 2014; Musa & Saliu, 2016).

Answers to these questions will reveal areas for improvement of the curriculum at ABU and serve as guides for evaluating the curriculum of other Schools of Architecture in future.

Literature Review

History of Architecture Education

The historical development of formal architecture education is traced to Vitrivius' *Ten Books on Architecture* where the distinction between theory and practice was made. "Theory is the ability to demonstrate and explain the principles of proportion while practice is the continuous and regular exercise of employment, where manual work is carried out according to drawing design" (Al-Hassan, 2010, p. 267). An architect's education in Greece and Rome incorporated these two aspects: theoretical principles such as proportion and training in the actual technicalities of building (ibid). This model is still practiced in many Schools of Architecture.

Prior to the Middle Ages from ancient civilizations during the time of the pyramids, architecture education did not follow any institutional curriculum. Tradesmen such as masons and carpenters whose craft were taught in secret guilds carried out design on building sites. Architects and artists thus learnt the trade of building through experimentation and effort (Al-Hassan, 2010). This all-round training without much theory continued through the Renaissance when architects practiced sculpture, drawing and painting instead of designing buildings (Carpenter et al. 1997). The origins of Formal architectural education is traced to the mid 1470smid-1470s with the establishment of *Academia Platonica* in Florence to counter the influence of craft guilds under the influence of Lorenzo de Medici and Leon Battista Alberti (Mahmoodi, 2001). "This academia soon became a viable alternative to the existing training trends of students working under the supervision of master artists, painters, architects and sculptors" (ibid, p. 15). The first split between architecture and construction occurred when Jean-Baptiste Colbert founded the *Academic Royal d'Architecture* in 1671 to formulate theory and regulate standards of training architects. The establishment of *Ecole des Beaux-Arts* from 1816 promoted rational classicism based on theory. This educational approach was adopted in varying degrees worldwide but notably in Britain, Germany and America.

The British pupilage system involved young pupils paying to work with a master while occasionally attending lectures frequently incorporating trips to Europe, largely to expose pupils to the rudiments of practice and site work (Mahmoodi, 2001). The requirement of architects working under supervision for a minimum of 2 years prior

to sitting the Nigerian Institute of Architects' Professional Practice Exam (NIAPPE) is a legacy of this system (Babadoye, Adewale, Olabode, & Aribisola, 2013). The German Bauhaus, which later influenced the American system of architecture education, was founded upon the Arts and Crafts movement of 1880s in Britain with a focus on the role of material and construction techniques. American architecture education later developed the course credit system adopted by many Schools of Architecture with ADS at the core of the curriculum. Problems associated with the course credit system largely relate to the adaptation of the system in local contexts of Architecture Schools such as Iran (ibid).

Architecture Education at Ahmadu Bello University Zaria

Architecture education in Nigeria was introduced in 1952 with the establishment of the first School of Architecture at the Nigerian College of Science and Technology, Ibadan. The school was then transferred to Zaria in 1955 as a 5-year program culminating in the award of a Diploma qualifying the student to write the RIBA final exams (Maina, 2008). This program was later converted to the Bachelor of Architecture (B. Arch) program when the college in Zaria was upgraded to Ahmadu Bello University in 1962. The Egbor committee set up by the government to review the B. Arch programme recommended a curriculum change to the 2-tier BSc/MSc model in 1968. The curriculum was subsequently converted to the 4-year course-credit system based on 2 semesters per academic year from 1988 (Abdulkarim, 2011). Abdulkarim (2009) however notes that the most serious problem facing the course-credit system in Architecture at ABU "is the poor academic performance leading to non-graduation of students" (p. 144-145).

Other problems relate to administrative problems notably inadequate infrastructure, facilities and equipment; insufficient qualified and dedicated academic staff especially at senior levels to lead and inspire younger staff (top empty and bottom heavy syndrome); insufficient guidance/counseling for students in selecting controlled elective courses as well as delays in administering, compiling and computing continuous assessments and examination results (ibid). Findings from the study by Abdulkarim (2011) largely formed the basis for a proposal of a new curriculum of architecture based on faculty or school structure to fit current challenges of the 21st Century. The new curriculum is

based on a program which "aims at developing a creative approach to understanding and providing solutions to design problems with the motivation to creatively seek new solutions to the issues and challenges facing a developing country with a rich cultural heritage such as Nigeria" (Revised Programmes, 2012 p. 3). The philosophy stresses the physical as well as socio-cultural factors in the design process so as to produce competent, creative, critically minded and ethical professional designers/builders (ibid). The 4-year undergraduate degree program generally aims at laying the theoretical and practical foundation for the study of the Architecture profession.

Important highlights of the curriculum with respect to the BSc program include increasing studio hours, dedicating the second semester 300L to a compulsory 6 months Students Industrial Work Experience Scheme (SIWES) as well as eliminating duplications and wastages in some theory courses (Architectural History, Theory and Materials). Implementation of the curriculum commenced in 2012.

The courses that make up the architectural curriculum in the Department of Architecture at Zaria are organized in three main categories-Core, Cognate and Elective courses. Core courses provide fundamental and foundational knowledge and skills. They include Architectural Design Studio (ADS), Building Construction, Building Structures and Student Industrial Work Experience Scheme (SIWES), (Revised Programmes, 2012). SIWES takes up six months industrial attachment where students acquire practical internship experience and training in architectural firms, construction and building materials manufacturing companies (ibid).

Cognate courses are pooled from related disciplines in the Built Environment and Humanities to complement core courses. Electives consist of optional additional courses chosen by the department from allied disciplines such as Urban and Regional Planning, Fine Arts, Surveying, Sociology and the humanities. These serve to enhance the quality of architecture education. Core and cognate courses are compulsory in architecture education and constitute about 70% of the National Universities Commission (NUC) minimum standard for accreditation in schools of architecture (Musa & Saliu, 2016).

Gender issues and Mode of Entry in Architecture Education

Studies on gender in architecture have been rare in part because "Architecture represents a creative, high profile and influential profession and yet remains under theorized from a gender perspective" (Sang, Dainty, & Ison, 2014, p. 247). While studies relating to perceptions of the gender divide in the profession or education and training present issues of marked differences (Niculae, 2012), empirical studies reviewed largely present little or no differences in actual scores or ratings of courses based on gender in architecture education. Musa and Saliu (2016) found no gender differences in performance for ADS.

The study however reveals that the performance of male students were on average, better than their female counterparts in Building Construction, in line with findings from Rokooei and Goedert (2014). This was the reverse for Building Structures where female students performed better than their male counterparts in the department between 2011-2015. These results support the assertion that technical competence in construction related matters is a gendered construct (Sang, Dainty, & Ison, 2014) and that female students are at a disadvantage in technical related courses in construction education (Rokooei & Goedert, 2014). Bicer (2013) also found no gender differences in overall architecture education, contrary to strong assertions by Niculae (2012), thus encouraging greater female enrolment in the course. Results from the aforementioned studies were however, obtained from test or examination scores. Views on how the curriculum impacts design from the student perspective is largely unavailable. This study intends to fill this gap.

Entrance into university programmes are through University Matriculation Examination (UME), Direct Entry (DE) and for some institutions like ABU, through a school based pre-first degree programme; i.e. School of Basic and Remedial Studies (SBRS). UME is the traditional means students gain entry into Tertiary institutions nationally via a standard examination conducted and supervised by the Joint Admissions and Matriculations Board (JAMB) nationwide. The same body regulates DE admission for candidates with National Diplomas and its equivalent who are admitted into the second or third year of university programmes (200 and 300L respectively). SBRS candidates are admitted into the first year (100L)

programmes having passed prescribed examinations set by individual universities.

Regarding assessment of mode of entry in response to observed falling quality of architecture graduates especially from practice, Adewale and Adhuze (2014) found a low correlation between academic performance of architecture students and entry qualifications in Mathematics and Physics. Opoko, Alagbe, Aderonmu, Ezema and Oluwatayo (2014)likewise observed no correlation between entry qualifications and academic performance of architecture students in building construction. Musa and Saliu (2016) however note that Direct Entry (DE) students, specifically from 300L performed much better in ADS than other students who entered the course at 100L through Universities Matriculation Examinations (UME). The lowest performances came from DE students who enrolled for the programme at 200L.

Methodology

In order to assess the impact of courses taken as part of the curriculum at the undergraduate level in ABU, a mixed approach was adopted in line with methodologies employed by similar studies. Questionnaires were distributed in February 2015 targeting the 110 final year students of the department with a return rate of 78% (N 86). The questionnaire was designed to elicit two types of information. The first set relate to demographics (age, gender, entry qualification and previous design experience) while the second evaluates the impact of courses taken from 200L when students commence full-fledged lectures in the department to first semester, 400L. Impact was measured using a 5-point likert scale (with 5 denoting high impact to 1, negligible/no impact). Students were also requested to proffer suggestions towards improving the curriculum at the end of the questionnaire. This option was chosen because students were uncomfortable with proffering objective suggestions via interviews, which are not anonymous. Interviews were however conducted with the Heads of both the Undergraduate and Postgraduate Sections. These are the principal officers directly involved with registration and monitoring of how the curriculum is implemented in the department.

In response to the first research question regarding which courses most impact design, results were quantitatively analyzed for the number of students who assessed each course (N), actual ratings (number and percentage), means (M),

standard deviations (SD) for means as well as Relative Impact Index (RII). The mean, M is the average impact score of a course on design. The SD reveals the spread of individual scores around the mean. A low SD (less than 1) relative to the mean score denotes most students rated a course close to M while a high SD (above 1) denotes variability of ratings from M. RII is computed as the ratio of the total actual score (AS) from all respondents for each course and the maximum possible score (MPS). MPS is obtained as the product of N and 5, the latter being the maximum rating respondents can provide for each course in the questionnaire. For the purpose of this study, courses with RII equal to or above 0.76 (Table 1) are deemed to have the most impact on design in ADS.

Table 1: Guide to degree of impact on design.

Degree of Impact	**RII score/rating**
High impact	0.76 above
Impactful	0.66-0.75
Low impact	0.45-0.65
No impact	0.44 - below

Adapted from Waziri & Vanduhe (2013)

To address the second research question of differences between mean scores of Core, Cognate and elective courses, Friedman's ANOVA within SPSS was employed for this analysis as the scores of means was revealed to be non-normally distributed across the sample. Friedman's ANOVA, based on ranked data is employed to test differences between more than two conditions and the same entities have provided scores in all conditions (Field, 2013). It is especially beneficial when assumptions of normality are violated.

In response to the third research question regarding differences from gender and entry level categories for courses with high impact on design, Mann-Whitney and Kruskal-Wallis tests were conducted respectively on ratings for courses most impacting design as distribution of scores were found to be non-normally distributed across the sample. Mann-Whitney tests were carried out to establish if there were differences between scores from male and female respondents regarding impact of courses on design. Field (2012) notes that the procedure is employed to test the hypothesis that two groups of different entities (for this study, male and female) differ from each other on some variable (in this case, each of the courses). Results are presented as means M (for average scores), median (*Mdn*) as the test is based on ranked scores, the test statistic (*U*) and its exact

significance or *p* value. In a similar vein, the Kruskal-Wallis test (*H*) was employed to test for differences in ratings of the impact of courses on design because there were more than two non-normally distributed categories of entry qualifications, namely

UME, SBRS and DE. Results are also presented as the Mann-Whitney test described above. Qualitative data in form of direct quotes from interviews proffer additional explanations on observed results and suggestions on ways to improve the curriculum. These appear in italics within the text.

Results and Discussion

Results

Findings from the demographic data are consistent with studies from the same population (Aminu, 2015; Adedire, 2015). Majority of respondents are male students (72%). 82.6% of respondents are aged 20-25 years old and were admitted into the course through the UME channel (Table 2).

Variable	Category	N	%
Gender	Male	62	72.1
	Female	20	23.3
	Missing	4	4.7
Entry qualification	UME	56	65.1
	SBRS	19	22.1
	DE	9	10.5
	Missing	2	2.3
Age	Below 20	4	4.7
	20-25	71	82.6
	26-30	8	9.3
	31-35	3	4.5

Table 2: Summaries of demographic data from final year students 2014/2015 session

In response to the first research question, fourteen courses recorded RIIs equal to or above 0.76 (Table 3). With the exception of Technical Report Writing, all are practical related courses, with avenues for students to understand the direct application of the course to design. This is also true of the next eleven courses. Respondents rated theoretical courses such as History and electives from allied disciplines not domiciled within architecture department lower.

SIWES was ranked highest for impact on design, thereby justifying it'sits inclusion within the new curriculum. It is also the only course rated by all respondents. Building Construction is ranked second, making core courses the most impactful on design from the student perspective. This finding is supported by results from the Friedman's ANOVA in response to research question two where a statistically significant difference (=49.53, DOF 2, p=0.00) was obtained between core courses (M 4.34), cognate courses (M 3.61) and electives (M 3.71). In essence, students averagely rated core courses as having the most impact on design, followed by electives and lastly cognate courses. The only core course not rated highly was Building Structures, ranked 24th (Table 3). This finding is consistent with difficulties observed for architecture students in not easily comprehending building structures, unlike their engineering counterparts .

Regarding the influence of gender on ratings for impact of courses on design, no statistical differences were obtained for categories of core, cognate and elective courses (Table 4). This trend is evident in the results for courses most impacting design, with the exception of Hausa and Islamic Architecture were female ratings were on average significantly higher (U=546.5, $p=0.042$) than their male counterparts (Table 4). The reverse is the case with Site planning where males rated the course significantly higher on impact on design (U=40.5, $p=0.040$) than female respondents. Both courses are however elective courses not taken nor rated by the whole class (Table 3). Site planning is also an elective offered by the department of Urban and Regional Planning, and not domiciled within the department of Architecture.

Table 3: Ratings for impact of courses on design

Course	Category	1 Negligible impact	2 Little impact	3 Neutral	4 Impactful	5 High impact	Missing values	Mean	Std. Dev.	N	Sum	RII	Rank
SIWES	Core	0 (0%)	1 (1%)	0 (0%)	9 (11%)	76 (88%)	0 (0%)	4.86	0.438	86	418	0.97	1
Building Construction I-IV	Core	0 (0%)	0 (0%)	2 (2%)	10 (12%)	72 (84%)	2 (2%)	4.83	0.434	84	406	0.94	2
CAAD	Cognate	0 (0%)	2 (2%)	4 (5%)	15 (17%)	58 (67%)	7 (8%)	4.63	0.701	79	366	0.93	3
Sustainability & Architecture	Cognate	1 (1%)	2 (2%)	6 (7%)	18 (21%)	56 (65%)	3 (4%)	4.52	0.832	83	375	0.9	4
Research Methods	Cognate	1 (1%)	8 (9%)	12 (14%)	22 (26%)	40 (47%)	3 (4%)	4.11	1.059	83	341	0.82	5
Building Maintenance	Cognate	0 (0%)	3 (4%)	20 (23%)	31 (36%)	29 (34%)	3 (4%)	4.04	0.862	83	335	0.81	6
Building Construction Tech.	Elective	1 (1%)	2 (2%)	4 (5%)	2 (2%)	12 (14%)	65 (76%)	4.05	1.284	12	85	0.81	6
Site Planning/Landscape Design	Cognate	7 (8%)	0 (0%)	16 (19%)	33 (38%)	29 (34%)	1 (1%)	3.99	0.932	85	339	0.8	8
Building Services Mechanical	Cognate	7 (8%)	0 (0%)	16 (19%)	30 (35%)	32 (37%)	1 (1%)	4.02	0.951	85	342	0.8	8
Site Planning	Elective	2 (2%)	0 (0%)	11 (13%)	10 (12%)	14 (16%)	49 (57%)	3.97	0.957	37	147	0.79	10
Hausa/Islamic Arch	Elective	3 (4%)	6 (7%)	10 (12%)	27 (31%)	21 (24%)	19 (22%)	3.85	1.104	67	258	0.77	11
Technical Report Writing	Elective	2 (2%)	2 (2%)	4 (5%)	6 (7%)	10 (12%)	62 (72%)	4	1.308	24	92	0.77	11
Building Services Electrical	Cognate	2 (2%)	6 (7%)	23 (27%)	27 (31%)	26 (30%)	2 (2%)	3.82	1.032	84	321	0.76	13
African Trad. Architecture	Elective	1 (1%)	3 (4%)	11 (13%)	18 (21%)	11 (13%)	42 (49%)	3.8	0.978	44	167	0.76	13
Interior Design	Cognate	3 (4%)	6 (7%)	20 (23%)	29 (34%)	22 (26%)	6 (7%)	3.76	1.058	80	301	0.75	15
Building Material Science	Cognate	3 (4%)	6 (7%)	20 (23%)	17 (20%)	23 (27%)	17 (20%)	3.74	1.146	69	258	0.75	15
Building Acoustics	Cognate	1 (1%)	3 (4%)	11 (13%)	14 (16%)	9 (11%)	48 (56%)	3.71	1.011	38	141	0.74	17

Computer Applications	Cognate	5 (6%)	4 (5%)	5 (6%)	9 (11%)	13 (15%)	50 (58%)	3.58	1.442	36	129
Arch Workshop Practice	Elective	2 (2%)	1 (1%)	4 (5%)	7 (8%)	4 (5%)	68 (79%)	3.56	1.247	18	64
Model making	Elective	2 (2%)	1 (1%)	9 (11%)	7 (8%)	6 (7%)	61 (71%)	3.56	1.158	25	89
Concrete Technology	Cognate	1 (1%)	15 (17%)	20 (23%)	25 (29%)	15 (17%)	10 (12%)	3.5	1.065	76	266
Arch Programming	Cognate	9 (11%)	9 (11%)	13 (15%)	30 (35%)	18 (21%)	7 (8%)	3.49	1.28	79	276
Environmental Planning	Elective	1 (1%)	1 (1%)	3 (4%)	1 (1%)	3 (4%)	77 (90%)	3.44	1.424	9	31
Building Structures I-IV	Core	11 (13%)	7 (8%)	25 (29%)	20 (23%)	21 (24%)	2 (2%)	3.39	1.308	84	285
Entrepreneurship/ Innovation	Cognate	11 (13%)	8 (9%)	18 (21%)	19 (22%)	20 (23%)	10 (12%)	3.38	1.366	76	257
History/theory Ancient, trad. Architecture	Cognate	0 (0%)	10 (12%)	21 (24%)	17 (20%)	7 (8%)	27 (31%)	3.22	1.084	59	190
History/Theory Modern Architecture	Cognate	12 (14%)	14 (16%)	20 (23%)	21 (24%)	15 (17%)	4 (5%)	3.16	1.319	82	259
History/Theory of Classical Architecture	Cognate	6 (7%)	18 (21%)	20 (23%)	21 (24%)	11 (13%)	10 (12%)	3.17	1.182	76	241
Building Measurement	Cognate	13 (15%)	19 (22%)	18 (21%)	19 (22%)	15 (17%)	2 (2%)	3.05	1.343	84	256
Presentation Techniques	Cognate	15 (17%)	21 (24%)	13 (15%)	17 (20%)	16 (19%)	4 (5%)	2.98	1.414	82	244
Contemporary Urban form	Elective	1 (1%)	4 (5%)	2 (2%)	2 (2%)	2 (2%)	75 (87%)	3	1.342	11	33
Planning Theory	Elective	2 (2%)	2 (2%)	2 (2%)	4 (5%)	1 (1%)	75 (87%)	3	1.342	11	33
Building Quantities	Elective	3 (4%)	2 (2%)	7 (8%)	0 (0%)	1 (1%)	73 (85%)	2.54	1.127	13	33

Urbanization	Elective	2 (2%)	3 (4%)	5 (6%)	3 (4%)	1 (1%)	72 (84%)	2.86	1.167	14	40
Trad. Construction Methods	Elective	3 (4%)	2 (2%)	5 (6%)	4 (5%)	1 (1%)	71 (83%)	2.87	1.246	15	43
Adv. Perspective Drawing	Elective	1 (1%)	5 (6%)	4 (5%)	1 (1%)	2 (2%)	73 (85%)	2.85	1.214	13	37
Planning Principles/Processes	Elective	2 (2%)	0 (0%)	7 (8%)	2 (2%)	0 (0%)	75 (87%)	2.82	0.982	11	31
Surveying for Professionals	Cognate	15 (17%)	16 (19%)	24 (28%)	17 (20%)	5 (6%)	9 (11%)	2.75	1.194	77	212
General Photography	Elective	3 (4%)	3 (4%)	3 (4%)	3 (4%)	1 (1%)	73 (85%)	2.69	1.316	13	35
Urban Forms and Processes	Elective	5 (6%)	7 (8%)	3 (4%)	2 (2%)	3 (4%)	66 (77%)	2.55	1.395	20	51
20th Century African Art	Elective	2 (2%)	3 (4%)	1 (1%)	1 (1%)	1 (1%)	78 (91%)	2.5	1.414	8	20
Moral Philosophy	Cognate	30 (40%)	17 (20%)	12 (14%)	12 (14%)	7 (8%)	8 (9%)	2.35	1.366	78	183
Intro. To Valuation	Elective	5 (6%)	2 (2%)	4 (5%)	1 (1%)	0 (0%)	74 (86%)	2.08	1.084	12	25
General Art History	Elective	5 (6%)	3 (4%)	1 (1%)	2 (2%)	0 (0%)	75 (87%)	2	1.183	11	22
African Art Pre-20th C	Elective	4 (5%)	3 (4%)	1 (1%)	1 (1%)	0 (0%)	77 (90%)	1.89	1.054	9	17
Intro. To Urban Sociology	Elective	6 (7%)	4 (5%)	1 (1%)	1 (1%)	0 (0%)	74 (86%)	1.75	0.965	12	21

Table 4: Ratings based on Gender for impact of courses on design

Course	Male (N 62)		Female (N 20)		*U*	*p value*
	Mean	*Mdn*	Mean	*Mdn*		
Core courses	4.4	4.333	4.275	4.33	538	*0.366*
Cognate courses	3.65	3.78	3.396	3.433	473	*0.114*
Electives	3.63	4	3.99	4	644	*0.169*
SIWES	4.84	5	4.78	5	639	*0.718*
Building Construction I-IV	4.87	5	4.9	5	526	*0.52*
Research Methods	4.17	5	4.05	4	522	*0.552*
Building Maintenance	4.05	4	4	4	571.5	*0.737*
Sustainability and Architecture	4.51	5	4.55	5	628	*0.601*
Site planning/Landscape design	3.96	4	3.9	4	562.5	*0.583*
Building Services Mechanical	4.02	4	3.95	4	588	*0.799*
Building Services Electrical	3.84	4	3.68	4	547.5	*0.706*
CAAD	4.65	5	4.53	5	477	*0.323*
Hausa/Islamic Architecture	3.66	4	4.21	4	546.5	*0.042**
African Traditional Architecture	3.82	4	4	4	167.5	*0.567*
Building Construction Tech.	4.11	5	4	4	16.5	*0.853*

Overall, no differences were obtained for ratings of core, cognate and elective courses on design based on entry requirements (Table 5). Tests conducted for high impact courses further support this position. Only one course, Building Services Mechanical recorded a significant difference in ratings (H= 6.096, $p = 0.047$) as scores from DE respondents (M 4.75, *Mdn* 5.00) significantly differed from student ratings for UME (M 3.88, *Mdn* 4.00) and SBRS (M 4.05, *Mdn* 4.00).

Table 5: Ratings based on Entry requirements for impact of courses on design

Course	UME (N 53)		SBRS (N 19)		DE (N 9)			
	Mean	*Mdn*	Mean	*Mdn*	Mean	Mdn	*H*	*P*
Core courses	4.35	4.33	4.42	4.33	4.38	4.50	0.051	*0.98*
Cognate courses	3.53	3.58	3.67	3.76	3.94	3.93	2.843	*0.24*
Electives	3.70	4.00	3.760	4.00	3.64	4.00	0.036	*0.98*
SIWES	4.85	5.00	4.89	5.00	4.88	5.00	0.024	*0.988*
Building Construction I-IV	3.82	5.00	4.89	5.00	5.00	5.00	1.315	*0.518*
Research Methods	4.04	4.00	4.37	5.00	4.13	4.50	1.354	*0.508*
Building Maintenance	4.02	4.00	4.11	4.00	4.27	4.50	0.576	*0.75*
Sustainability and Architecture	4.58	5.00	4.44	4.50	4.43	5.00	2.467	*0.29*
Site planning/Landscape design	3.92	4.00	4.05	4.00	4.14	4.00	0.498	*0.78*
Building Services Mechanical	3.88	4.00	4.05	4.00	4.75	5.00	6.096	*0.047**
Building Services Electrical	3.73	4.00	3.79	4.00	4.38	5.00	2.766	*0.25*
CAAD	4.53	5.00	4.89	5.00	4.86	5.00	4.047	*0.13*
Hausa/Islamic Architecture	3.95	4.00	3.69	4.00	3.38	3.50	2.996	*0.22*
African Trad. Architecture	3.97	4.00	3.70	4.00	3.50	3.50	0.941	*0.63*
Building Construction Tech.	4.00	5.00	4.60	5.00	3.50	3.50	1.219	*0.54*
Technical Report Writing	3.67	4.00	4.17	5.00	4.50	4.50	1.275	*0.53*
Site planning	3.81	4.00	4.13	4.00	4.00	5.00	0.741	*0.69*

**Significant at 0.05*

Discussion

Practical oriented courses record highest impact on design

Results from the study reveal that practical oriented courses were rated highly for impact on final year design. This finding resonates along similar lines with ratings from master's students from the same institution (Maina, 2015) as well as comments from interview sessions and suggestions made by respondents on modalities to improve the curriculum.

Student A noted *"more practical classes should be added to the curriculum to make students have a better understanding in design and construction."*

Student B asserts *"courses should focus on encouraging students to the reality of practice than theories."* The last comment in part explains the lower ratings accorded theoretical based courses, which though considered relevant to the holistic education of the future architect, is perceived as having less impact on design.

To shed further light, Student C explains: *"The curriculum should be designed in such a way that students begin to have a feel of what professional practice entails right from 100L by ensuring site visits and real life examples. Going for site visits is highly important to improve on the knowledge of the construction process and how buildings are physically laid out"*.

In response to the suggestion by student D that "*site visits be given more priority for construction related courses"*, staff interviewed noted that it was not always practically possible to organize and embark on such studies due to logistics involving large class sizes and access to funds. *"While it is expedient and vital to the overall student experience, who foots the bill and pays for transport, communication and other logistics? Will it be staff or students as it is often difficult to access funding from institutions for such field trips"*. This was found to be also be a pertinent issue in a similar study conducted by Bashir, Ahmad and Hamid (2013).

Results also revealed that Building Structures was the only core course not rated highly for impact on design, in part because students often struggle to understand it's direct relevance to their design.

Student E: *"Students should be made to understand the critical importance of structures to buildings from 100L. Although taught very competently, we often struggle to*

find the relevance of bending moments in practical design. For example, if students are continuously told not having this knowledge will ultimately lead to building collapse and loss of lives, we will view the course differently. When students are properly informed from the beginning the implications of not applying certain kinds of knowledge, it is easier to implement such knowledge in design."

Student F: *"Courses such as Building Structures should be made more practical. We want to know how the bending moments,moments; shear forces etcetera affect our design."*

In response to this problem, Hedges (2014) proposes a paradigm shift in the way building structures is taught using a top-bottom cognitive approach. Here, students are first taught explicit information about what the knowledge of the course will affect design before delving into the mathematical calculations many students find difficult to initially understand.

Overall, it is crucially important that the relevance of all courses to architectural design and practice be effectively communicated to students at the commencement of classes to maximize the effectiveness of the courses in the curriculum. Further studies are needed on modalities encouraging a shift away from traditional teaching paradigm to the objective based educational model where students are made to critically think and produce knowledge (Salama, 2008) in line with current best world practices.

Elective courses impact design more than cognate courses

Results from the study also reveal that overall, elective courses, especially those domiciled within the department, rank high on impact to design. Many of the elective courses from other allied disciplines were rated relatively lower (Table 3). A reason proffered for this result was that the curriculum was already overburdened and stressful for students who focus on only what they perceive as being relevant.

Student G: *"Less relevant courses should be struck out from the curriculum . . . reduce the number of courses by merging related courses to one."*

Student H: *"Courses that are irrelevant to architecture should please be removed to reduce work load for students."*

Student I: *"400L should be less bulky in*

terms of courses . . . basically Design, Structures, Construction and any other relevant 3."

Gender and entry qualifications do not significantly influence ratings of impact on design

Gender on average, did not significantly influence ratings of the most highly impacting courses on design. Although two courses record significant differences, both are elective courses not rated by all respondents.

The overall non-significant result lends credence to the notion proffered by Bicer (2013) suggesting gender has no influence on creative abilities and design related capabilities of students. It also supports findings from ABU that scores for male and female students did not significantly differ in design (Musa & Saliu, 2016). In essence, females are not disadvantaged in relation to design and creative abilities. For a course where the balance in enrolment numbers have consistently been skewed towards males, this finding adds to the gender discourse especially in support of improving female enrolment in HE and career opportunities for girls hoping to engage in design related courses and programmes.

Similarly, mode of entry was overall, not significantly influential for ratings of courses highly impacting design of final year students from the sample. The exception was Building Services Mechanical where results reveal that DE respondents had significantly higher ratings than their UME and SBRS counterparts. The course, taken in 300L, deals with water demand, supply and distribution as well as other practical as aspects of drainage, sewage disposal, sanitary appliances, sewage treatment, refuse collection and disposal (Revised Programmes, 2012). DE students who have completed a diploma prior to embarking on the programme have been exposed to more practical site work, relative to the other categories of respondents.

This finding supports the suggestion earlier proffered by students that site work is critical to a good understanding of the design process and to architectural practice in general. It also supports the finding that DE male students generally perform better than other categories of students (Musa & Saliu, 2016). More frequent evaluations of the curriculum in terms of actual scores and ratings are essential to establish these trends in future.

Conclusion and Recommendations

This study set out to investigate courses having the highest impact on design of final year students of architecture with the aim of establishing areas of improvement in future. Results reveal that practical courses such as SIWES, Building Construction, CAAD, Sustainability and Architecture amongst fourteen courses were rated high on impact on design of final year undergraduate students. Overall, departmental electives were also rated more highly than theoretical cognate courses designed to complement core courses in the architectural curriculum. Additionally, gender and mode of entry on average had no significant influence on ratings of courses highly impacting design. Findings confirm that it is advantageous to have some experience in site and practical work when studying architecture (Bashir, Ahmad & Hamid, 2013).

Recommendations from the paper target the department of Architecture in ABU and other schools and architecture students in general. First, it is expedient that the curriculum be designed to reduce work overload of courses especially at final year levels. This is a period when students are rounding up their coursework and need to consolidate their grades. Having a plethora of cognate courses to deal with only hampers the rounding up process. Secondly, it is also imperative that the education curriculum in architecture begin the shift towards objective and outcome based education in part to ensure that the education received by graduates be compared to similar programs in other schools in order to meet global best practices. This is important because it has the potential to boost employability of graduates internationally, as similarity of educational experiences enables significant mobility of architects among firms, different areas of specialization and contexts (Salama, 2008).

Thirdly, schools of architecture need to develop modalities for attracting funding for practical related exposure of students to site and related work. This has been a recurring issue among students-the adequate exposure of students to what can be practically seen and employed in design. In line with this, students need to be more proactive in their education as learning is not dependent on what is taught formally within lecture halls and classrooms. School administrators, lecturers and counsellors need to propagate this attitudinal change right from the beginning of the program.

As a limitation, the study was conducted in one department of architecture in Nigeria.

Results can therefore not be generalized. Consequently, similar studies need to be conducted in other schools to enhance generalization.

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