RELEVANCE OF MANUAL DRAFTING IN DESIGN STUDIO EDUCATION IN NIGERIA: COVENANT UNIVERSITY ARCHITECTURE STUDENTS PERSPECTIVE

O. Alagbe, P. Aderonmu, A. Opoko, A. Oluwatayo, O. Dare-Abel

Department of Architecture, Covenant University (NIGERIA)

Abstract

In the midst of a globalized world characterized by deployment of information computer technology (ICT) in all spheres of learning and practice, architectural students very often find themselves at the centre of two opposing forces existing as a result of past or present contrasting cultures and architectures, along with their attendant values and methods of expression. One of such is the insistent by some schools of architecture in Nigeria that undergraduate student's design studio courses must be done through manual drafting. However, it is observed that students have strongly resisted this policy. Thus, this paper evaluated the relevance of manual drafting in the training of architecture students in design studio education. Covenant University, Ota, Nigeria was purposively selected for this study. Data was collected by means of structured questionnaires administered to students from the second year to the sixth in the 2013/2014 academic session. Data obtained was analysed using descriptive statistics. Results showed that there is almost an equal spilt of students who are of the view that manual drafting is no longer relevant as well as those who think it is still relevant. Most of the students prefer to use both manual drafting and CAD. The possible reasons for this were adduced. The paper suggested that the use of manual drafting should not be completely discarded in the training of undergraduate architecture students, but juxtaposed with digital drafting.

Keywords: Architectural education, Covenant University, Design studio, Drafting, ICT.

1 INTRODUCTION

Architectural education is distinguished from other disciplines being one anchored on apprenticeship. The apprenticeship of the future professional is shaped and modelled within the confines of the design studio. For this reason, [1] remarked that the design studio lies at the heart of architectural education. In support of this view, [2] noted that architectural educational training of the future professional is based primarily around the design studio as a pivot and gathering point of all knowledge and skill accreted throughout the curriculum. Many students actually spend most of their time in the design studio, where they work, study, eat, and even sleep [3], [4]. Furthermore, [5] pointed out that the design studio is at the heart of most industrial design curricula and is a place where students learn to visualise and represent aspects of a problem graphically and to think as a designer. The globalization of the profession thus makes it mandatory for schools of architecture to embrace the opportunities for necessary and visionary change to secure and guaranty the future of architectural education and practice of the profession.

However, architectural design students in most schools of architecture in Nigeria are faced with the policy of using manual drafting at the undergraduate classes for their design projects. The option of using digital or Computer Aided Design (CAD) media to design and present their works is not welcomed by the existing curriculum. Nevertheless, it is often detected that students employ CAD while camouflaging the presentations to reflect manual drawings in an attempt to obey the 'laws'. [6] identified these students as belonging to a group called "digital natives", those born into the knowledge of all the digital media available and find it a second nature to live and learn by it. There are obvious benefits of using CAD over manual drafting identified in literature. These include better accuracy; speed of drawing; ease of corrections and editing; versatility; robust creative options; and availability of instant components in the digital object libraries [7], [8]. It is becoming increasingly difficult to keep the students away from flouting the rules. This may continue until a convergence between the perspectives of the policy makers, teachers and students is reached.

From the fore-going, it can be deduced that the call for review of the Nigerian architectural education curriculum to adopt digital drafting method as the main method of design studio presentation at the undergraduate levels is apt. This call is in line with the realities of the trend in information communication technology of this age and in line with expectations of practitioners of the profession. It

also supports the agitation of future professionals who are hitching not to be left behind in the education trend of the digital age. While [6] agree that it is common place to see these forms of restrictions in schools of architecture, he advocated that design and drawing as skills and techniques will abide with the support of the available digital technologies

Therefore, this paper examined the continued relevance of manual drafting method in the training of architecture students in a typical Nigerian School of Architecture. Covenant University was selected for this study. At Covenant University, the curriculum embraces the learning of the CAD media but just like others, it insists on the use of manual media for design studio in the undergraduate levels. However, the postgraduate students are authorized to use any CAD or Building Information Modelling (BIM) media of choice.

2 THE CRADLE OF ARCHITECTURAL EDUCATION IN NIGERIA

Nigeria's involvement in higher education dated back to 1934, when the Yaba Higher College was established [3]. The establishment of the College according to [3] was not really aimed at producing fully qualified professionals, but at the training of middle-level manpower required by the Colonial administration. However, the much needed physical development envisaged for Nigeria after the Second World War made it imperative that appropriately qualified Nigerians be made available particularly in the science and the professional areas. Thus, the University College Ibadan was established in 1948 to provide opportunities for acquiring higher education relevant to the expanding needs of the country. This was later followed by establishment in 1952 of the Nigerian Colleges of Arts, Science and Technology (NCAST). It was in the Ibadan branch of NCAST that the first School of Architecture was established. The establishment of the School thus superseded the Technical Institute Yaba which was earlier established to provide training for Architectural Assistants. The School of Architecture in Ibadan was transferred to NCAST, Zaria branch in 1955 with all its students and staff. Graduates of the School were awarded Diploma certificates. The Diploma in Architecture Certificate was recognized by the Royal Institute of British Architects (RIBA) [9]. On October 4 1962, NCAST Zaria became a full-fledged University named Ahmadu Bello University, Zaria. Thus, the then School of Architecture was fully integrated into the university system which led to the change in nomenclature of its diploma to Bachelor of Architecture which was awarded for the first time in 1963 and was also recognized by the Royal Institute of British Architects (RIBA) [9].

In essence, architectural education in Nigeria was fashioned after the British education system and to a large extent in line with the curriculum of our colonial master [10]. The dominance of the British both in the education and the practice of architecture came to a subtle end after the establishment of the NIA in 1960. However, the link with RIBA was maintained until 1968, when the course programme was again restructured into the two-tier system with the offer of the Bachelor of Science (B.Sc.) and Master of Science (M.Sc.) degrees in architecture [10]; a practice that is still current in all Nigerian Schools of Architecture till date.

2.1 Manual or digital drafting methods in Nigerian schools of architecture?

As noted earlier, Nigerian Schools of Architecture practice the two-tier system of undergraduate and postgraduate study, which offers Bachelor of Science (B.Sc.), and Master of Science (M.Sc.) degrees in architecture respectively. The former is obtained after four years (five years for some University of Technologies) while the latter takes additional two years after completion of the former. It must be noted that design studio policy in all of these Schools of Architecture is that the manual (traditional) drafting method must be used at the undergraduate level while CAD (digital) is permitted at the postgraduate level. Several reasons were adduced for this decision ranging from difficulty in monitoring originality of students' design creativity by design studio tutors; inequality in financial capability of students to access digital equipment, software and hardware; and epileptic electricity supply to power digital equipment amongst others. However, the strongest argument for the use of digital drafting method at the undergraduate levels is that students should be well grounded in the traditional method before transition into digital drawing production. This is based on the argument that digitalization is a 'garbage-in-garbage-out' kind of design endeavour. Therefore, it is believed in the Nigerian architectural education curriculum context that future professionals must have adequate hands-on experience on manual drafting to enhance their design creativity, knowledge and understanding of basic design components and concepts after their transition to digital drafting methods.

Despite the fact that CAD courses are taught at the undergraduate levels, there have been calls for a review of the architectural education curriculum to accommodate the use of digital drafting as the basic means of design studio presentation at the undergraduate levels. The call is championed by practitioners of the profession who contend that graduates from Nigerian Schools of Architecture do not fit readily to work environment because they lack the basic expertise in the use of digital media which is the currency in practice in this age. Secondly, students in Nigerian schools of architecture have also agitated for the adoption of digital drafting method at the undergraduate levels. They argued that while manual drafting is necessary, it is not relevant in education and practice requirements of this age. Findings from literature also support this call. For instance, [11] posited that traditional production methods have changed with Industrial Revolution. [11] noted that while the Bauhaus concept of integrating art and craft as a whole is commendable, he submitted that technique and technology can be of value to art always. On the other hand, [12] underscored the usefulness of digital visualization techniques both in training and application in architectural education. In addition, [13] highlighted other advantages associated with the use of computer applications to design and drafting in architecture which include: drawing clarity; ease of making changes to drawings; drawing longevity; ease of managing drawing files; lower potential for errors; speed of plotting drawings and access to digital security. Conversely, [12] observed some challenges associated with the digital drafting method, which includes non-mastery of the digital technologies by design educators; non-availability of programs fully based on digital technology; and necessary infrastructure for hardware and software could not yet be produced in faculties of architecture.

2.2 Architectural education in the age of globalization

Globalization's objectives according to [14] entail overcoming geographic divides and boundaries. He posited that the effect of globalization has and will continue to force diverse cultures into unprecedented proximity, and an unavoidable dialogue. [14] argued further that the proximity brought about by globalization is both real and virtual with the latter being arguably the more forceful of the two. His conclusion is that contemporary globalization is intimately and indispensably linked to the information age. A view corroborated by [15] submission that countries and continents are getting closer because of globalization and good opportunities on Information and Communication Technology (ICT). The concept of globalization and internationalization is however not new to higher education institutions across the globe. [16] noted that while internationalisation is not new to universities and higher education policies, the forces and tensions understood by the umbrella concept of 'globalisation' constitute a dramatically different environment for higher education institutions and policy makers to operate in. Furthermore, the changes to which higher education all over the globe are increasingly exposed to, are complex and varied, even contradictory, and the comprehensive concept of globalisation are far from clear and well defined. Nevertheless, the concept of globalisation indicates that the various changes are somehow interrelated and creating new forms of interdependencies between actors, institutions and states. A view supported by [17] who observed that higher education has approached a level at which ICT plays a vital role in nearly all phases of the educational process. They observed further that while ICT revolution has taken place in many tertiary institutions, there is lack of institutional policies in place concerning the potential educational uses of these technologies coupled with high acquisition and running cost. They suggested that educational institutions develop policies to address fundamental and relevant ICT usage and application issues in their learning programs. It is on this premise that this paper evaluated the relevance of manual drafting in architectural education in a digital age taking the perspectives of Covenant University students, with a bid to develop a digital usage policy for the university at the undergraduate levels.

3 RESEARCH METHODS

A survey of architecture students in Covenant University from the second to the sixth year was carried out in the month of April 2014. The entire student population was taken as the sample size, giving a total of 412 students. The students were asked to fill a questionnaire, which consisted of three sections. The first section of the questionnaire consisted questions on the profile of the students, while the second section elicited information on the preferences for, and the proficiencies of the students in, Computer Aided Design (CAD) and Manual drafting. In the third section, the students were asked to indicate on a five-point Likert type response, their agreement with statements, which suggest their perception of the two drafting techniques under study. The responses vary from 1-strongly disagree to 5-strongly agree. The data obtained were analysed using descriptive statistics. Only 242 questionnaires were returned giving a response rate of 58.7 percent.

4   RESULTS AND DISCUSSION

The respondents were mostly male (70.2%), with 24.4% in the second year, 32% in the third year, and 22.7% in the fourth year. Fewer students (10.7% and 9.5%) were in the fifth and sixth years respectively, which were the second degree (Masters) classes. Most of the students (79.6%) were aged between 18 and 21 years, with 3.3% of the students younger and 17.1% of the students older than this age range.

The level of manual drafting proficiency amongst the students was slightly higher than the level of CAD proficiency. This is because, while 91.3% of the respondents indicated good-to-excellent manual drafting proficiency, 80.5% indicated good-to-excellent CAD drafting proficiency. This is probably the reason why 44.1% of the students indicated preference for both drafting methods. The results also show that 47.9% of the students prefer only CAD, while 7.6% of the students prefer manual drafting. Further analysis show that there is no significant relationship between preferred drafting method and gender, age or year of study. Similarly, there is no significant relationship between the preferred drafting method and the level of manual drafting proficiency. There is however a significant relationship between level of CAD proficiency (λ^2=, df=12, p=0.000). Most of the students who were less proficient in CAD tended to prefer using both methods of drafting while most of the students who indicated very good or excellent CAD proficiency preferred using CAD alone Table I.

Table I: Level of CAD proficiency and preferred drafting method.

		Preferred Drafting Method				
		Manual drafting	CAD	Manual Drafting and CAD	None	
Level of CAD proficiency	Poor	26.7%	26.7%	40.0%	6.7%	100%
	Fair	13.8%	27.6%	58.6%	.0%	100%
	Good	9.9%	39.4%	50.7%	.0%	100%
	Very good	2.1%	57.3%	40.6%	.0%	100%
	Excellent	.0%	75.0%	25.0%	.0%	100%

On the question of the relevance of manual drafting to design studio, less than half (40.1%) of the students believe that manual drafting is irrelevant to design studio in this age (Table II). It is interesting to note however that a sizeable number (38 students) were not decided on the perceived relevance of manual drafting. These results may suggest that manual drafting may still be relevant although the students express the desire to explore CAD in their design studio courses.

Table II: Manual Drafting is irrelevant in Design Studio of this age.

	Strongly disagree	Disagree	Undecided	Agree	Strongly agree
Frequency (Percent)	32 (13.2)	75(31.0)	38(15.7)	57(23.6)	40(16.5)

The fact that a higher percentage of students (44.2%) still agree that manual drafting is still relevant in design studio education may be backed by the opinions of the students that it is not hindered by electricity (M=3.61) and that it makes them better designers (M=3.37) (Table III). It would appear that many of the students would recommend both manual and CAD drafting (M=4.32), but not manual drafting alone (M=2.17) for undergraduate students. The results also suggest that there is moderate agreement between the students that originality is easier to monitor with manual drafting (M=3.29). In addition, there is moderate agreement between the students that manual drafting enhances both creativity (M=3.09) and understanding of construction details (M=3.09). Other factors that the students moderately agree in favour of manual drafting are that manual drafting proficiency determines CAD proficiency and the fact that it is cheaper since it excludes the costs of personal computers and printing. The students do not however seem to agree that manual drafting is user-friendly, faster, editable, and accurate and results in better presentation than CAD.

Table III: Students' Perception of Manual Drafting to Design Studio.

	Mean	Std. Deviation
I recommend Manual Drafting and CAD in Design Studio	4.32	.923
Manual drafting has fewer advantages than CAD (CAD has more advantages than Manual Drafting)	4.14	.859
Manual drafting is not hindered by electricity supply (CAD use is hindered by inadequate electricity supply)	3.61	1.029
Manual drafting enhances less creativity than CAD (CAD enhances creativity more than Manual Drafting)	3.42	1.123
Manual Drafting makes me a better designer than CAD users	3.37	1.136
Originality is easier to monitor with manual drafting (Originality is harder to monitor with CAD than Manual Drafting)	3.29	1.101
Manual Drafting enables me understand my construction details better	3.09	1.231
Manual drafting enhances creativity more than CAD	3.09	1.239
Manual drafting is cheaper as there is no cost of PC(CAD is more expensive because of cost of PC)	3.07	1.130
Manual drafting proficiency determines CAD proficiency (CAD proficiency is a function of Manual Drafting proficiency)	3.02	1.144
Manual Drafting proficiency does not determine CAD proficiency	2.96	1.167
Manual drafting is cheaper as there is no cost of printing (CAD is more expensive because of cost of printing)	2.90	1.103
I expressed my ideas better with Manual Drafting than CAD	2.83	1.194
Overall, manual drafting is cheaper than CAD (CAD is more expensive than Manual Drafting)	2.80	1.243
With manual drafting, detailing is more difficult than with CAD (CAD makes detailing easier than Manual Drafting)	2.79	1.168
I recommend only CAD in undergraduate Design Studio	2.68	1.227
Manual Drafting is a requisite for professional practice	2.62	1.115
Manual Drafting more user friendly than CAD	2.36	1.175
Manual Drafting presentation is better than CAD	2.18	1.063
I recommend only Manual Drafting in Undergraduate Design Studio	2.17	1.166
Manual Drafting is faster than CAD	1.74	.967
Manual Drafting easily editable for errors more than CAD	1.72	.984
Manual Drafting is more Accurate than CAD	1.68	.806

The results (Table III) further revealed that students strongly agree that manual drafting had fewer advantages than CAD. They however only moderately agreed that manual drafting enhances less creativity than CAD. This may appear to be in contrast with the results discussed earlier that manual drafting enhances more creativity than CAD. A closer look at the data revealed that many of the respondents who indicated that they were undecided on the tendency of manual drafting to enhance creativity more than CAD agreed that manual drafting enhances less creativity than CAD. This is probably the reason that the mean response indicated a stronger agreement for manual drafting enhancing less creativity than CAD. This may suggest that there is almost a balance in the rating of creativity engendered by both manual and CAD drafting. It would also be observed from the data that there is moderate agreement by the respondents that detailing is more difficult with manual drafting. This is despite the fact that manual drafting aids better understanding of construction details.

5   CONCLUSION

This study set out to investigate the relevance of manual drafting to design studio education, from the point of view of architecture students, taking a sample of students in Covenant University, Nigeria. The results suggest that manual drafting is still relevant to architectural design studio education, but also indicate the desire of students to combine this with CAD drafting. It would thus appear that the

students would like to counter the shortcomings of manual drafting by engaging the strengths of CAD. These shortcomings, as found in this study include inaccuracy, ease of editing, speed, and ease of detailing.

The results raise the question of the relationship between creativity and drafting methods. This could be further investigated to draw conclusions as to why the students seem to believe that both manual drafting and CAD enhance creativity. It would also be useful to investigate the stages of design when the students believe either manual drafting or CAD would be more useful. This is in the light of the preference of the students for both manual and CAD drafting.

There is a limit to the generalization of the results of this study. This is because students in only one institution were taken as the sample frame. There may be variance in the result if another institution is considered. Further studies would be required to ascertain if this is so.

REFERENCES

[1] Oh, Y., Ishizaki, S., Gross, M. D., & Yi-Luen Do, E. (2013). A theoretical framework of design critiquing in architecture studios. *Design Studies, 34*(3), pp. 302-325. doi:10.1016/j.destud.2012.08.004

[2] Mostafa, M., & Mostafa, H. (2010). How do architects think? Learning styles and architectural education. *Archnet-IJAR, 4*(2/3), pp. 310-317.

[3] Adeyemi, E. A. (2012). In the making of an architect: the Zaria experience. Ota: Covenant University Press.

[4] Anthony, K. H. (1991). Design juries on trial: The renaissance of the design studio. New York: Van Nostrand Reinhold.

[5] Green, L. N., & Bonollo, E. (2003). Studio-based teaching: history and advantages in the teaching of design. *World Transactions on Eng. and Tech. Edu, 2*(2), pp. 269-272.

[6] Cespedes, K. A. (2008). Design Education of the Digital Native. Joint study Journal. AutoDesSys.

[7] Dare-Abel O. A. & Daramola S. A. (2006). "Computer Aided Design in Architecture: A Value Added Technology". Proceedings of the International Conference on New Trends in the Mathematical and Computer Sciences with Applications to Real World Problems. Edited by: Ayo C. K. Ibadan University printer, pp. 307-318.

[8] Emmitt, S. (2002). Architectural Technology. Pub Blackwell Science: London, pp. 155-174.

[9] ABU Website. http://www.abu.edu.ng/dept/view_departments.php?depid=19&dept= Department+of+Architecture.

[10] Adegbile, M. (2012). Nigerian architectural education in a sustainable age. Sustainable Futures: Architecture and Urbanism in the Global South Kampala, Uganda, 27-30 June.

[11] Yurtsever, B. (2012). Re-thinking bauhaus on the context of architectural education. *Procedia - Social and Behavioral Sciences, 51*, pp. 135-139.

[12] Yildirim, T. & Yavuz, A. O. (2012). Comparison of traditional and digital visualization technologies in architectural design education. *Procedia - Social and Behavioral Sciences, 51*, pp. 69-73.

[13] Grassi T. (2002). 'CAD', Architect's Studio Handbook. Ed. Patterson T. Chapter Five, pp. 245-336. McGraw-Hill.

[14] Ameri, A. (2008). Architecture Pedagogy, Cultural Identity, and Globalization. *The International Journal of the Arts in Society, 2*.

[15] Tokman, L. Y. (2007). Disciplinary/Interdisciplinary Virtual Design Studio. Proceedings of Conference ICL2007, Villach, Austria, 26-28 September.

[16] Van Damme, D. (2001). Higher Education In The Age Of Globalisation: The need for a new regulatory framework for recognition, quality assurance and accreditation. Introductory Paper for the UNESCO Expert Meeting, Paris, 10-11 September.

[17] Chukwunonso, F. & Oguike, M. C. (2013). Challenges for the adoption of new ICTs in architectural education in Nigeria. *International Journal of Informatics and Communication Technology (IJ-ICT), 2*(3), 183-189. DOI: 10.11591/ij-ict.v2i3.5285