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A CASE FOR CADD IN THE STUDIO: AN APPRAISAL OF UNIVERSITY OF JOS DEPARTMENT OF ARCHITECTURE

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ABSTRACT

The students' use of programs such as AutoCAD in the design of their studio projects before manually drafting their designs for portfolio examination forms a significant part of the design process. This paper examines students' use of Computer Aided Design and Drafting (CADD) software programs in studios, in the Department of Architecture, University of Jos as case study. This paper also looks at the possibility of using use of CADD for the various aspects of the design process. This is accomplished through informal interviews with postgraduate students who are more inclined to use CADD as part of their conceptual design process and 3-D graphic modelling. This study is able to identify the effects of the use of computers in the design studio and how the teaching of CADD would enhance the methods employed in studio instruction.

Keywords: **Architectural Design, Computer Aided Architectural Design (CAAD), Computer Aided Design and Drafting (CADD), Design Process.**

INTRODUCTION

The first professional degree in Architectural education in most Nigerian Departments of Architecture is the Master of Science degree. The use of architectural design e-portfolios and electronic submission of studio designs has already been initiated in Nigeria. (Prucnal-Ogunsote, and Ude, 2008); indeed studies reveal the need for a constant evolution of the pedagogical presentation of technology both in studies and assessment. Previous studies on schools of architecture reveal most schools focus on teaching CADD in the under graduate curriculum, the exception being universities of technology as indicated in Table 1 (Ogunsote, Prucnal-Ogunsote and Umaru, 2007; Ola-Adisa *et al.*, 2012). In the University of Jos, CADD instruction begins at 400-level with the teaching of Computer Applications and the use of AutoCAD (2-D only).Consequently, the main mode of instruction of studio

design is manual drafting and the design process is generally appraised through examination of students' free hand sketches and pencil drawings before the final work is presented in ink. This is consistent with findings that studies are conducted in the traditional style in Nigerian schools of architecture without much innovation in teaching and research (Prucnal-Ogunsote *et al.*, 2010; Prucnal-Ogunsote, Ogunsote and Ogunsote, 2013). CADD is mainly taught in undergraduate programme, and while it is essentially, a drafting tool, BIM, 3-D modelling and computer simulation are not taught. Manual drafting is still the mode of expression in schools of architecture and entrepreneurial skills are just being introduced as a subject.

Table 1: Computer Courses in the Architecture Curriculum of Selected Universities

UNIVERSITY	COURSE	LEVEL		TYPE	
		Undergraduate	Postgraduate	2-D	3-D
Abubakar Tafawa Balewa University, Bauchi	CS 142: Introduction to Computer Science ARC 512: AutoCAD I	● ●		● ●	
Ahmadu Bello University, Zaria	ARCH 121: Introduction to Basic Computer ARCH 122: Introduction to Basic Computing ARCH 327: Introduction to CAD ARCH 328: Introduction to CAD ARCH 453: Computer Aided Design	● ● ● ● ●		● ● ● ● ●	
Ambrose Alli University, Ekpoma	MTH 103: Introduction to Computer ARC 755: AutoCAD (MSc II)	●	 ●	● ●	
Federal University of Technology, Akure	IMC 142: Introductory Computer Science IMC 241: Computer Programming I	● ●		● ●	
Federal University of Technology, Minna	CPT 121: Introduction to Computer Science I CPT 213: Introduction to Computer Science II ARC 614: Advanced Computer Aided Design I ARC 624: Advanced Computer Aided Design II	● ●	 ● ●	● ● ●	
Federal University of Technology,	CS101: Introduction to Computer Science I CS102: Introduction to Computer	● ● ●		● ● ●	

Yola	Science II	●		●	
	CS201: Computer Programming I	●		●	
	CS202: Computer Programming II	●		●	
	AR513: Computer in Architecture I				
	AR508: Computer in Architecture II				
Obafemi Awolowo University, Ile Ife	ARC 668: Computers in Architecture	●	●	●	
Olabisi Onabanjo University, Ibogun Campus	CSC 201: Computer Programming I	●		●	
	CSC 202: Computer Programming II	●		●	
	GNS 203: Introduction to Computer I	●		●	
	GNS 204: Introduction to Computer Application	●		●	
	ARC 307: Introduction to AutoCAD I	●	●	●	●
	ARC 308: Introduction to AutoCAD II				
	ARC 407: AutoCAD Workshop Practice I				
	ARC 408: AutoCAD Workshop Practice II				
	ARC 816: Advanced AutoCAD Presentation and Practice				
University of Jos, Jos	CS 101: Introduction to the Use of Computers	●	●	●	
	CS 201: Introduction to the Use of Computers	●	●	●	
	ARC 471: AutoCAD	●	●	●	

Source: Ogunsote *et al.*, 2007

Studies of the postgraduate (800-level students) in University of Jos reveal that they usually finalise their conceptual designs using one or more CADD software programs as a representational mode of thinking. The primary motivation of the students is to enable them convey their graphic ideas while attracting favourable reviews from their examiners. The thrust of this study is to closely look at the hidden side of the process while examining the rationale behind the creation process of these drawings (Salman, Laing& Conniff, 2008 in Ola-Adisa, Audu and Ella, 2012). The three-fold purpose of this study is to determine the types of CAAD (Computer Aided Architectural Design) and CADD (Computer Aided Design and Drafting) software used in the studio; understanding the context of the students' process through the observation of studio activities; and to know the motivational factors behind the students' use of CADD in the schematic phases of design process.

The Development of CADD over the Years

The terms CADD (Computer Aided Drafting and Design) and CAAD (Computer Aided Architectural Design) are often used interchangeably in design studies while CAD (Computer Aided Design) is often used instead of CAAD (Salman *et al.*, 2008in Ola-Adisa, *et al.*, 2012). A common base in computing was established by Achten (1996) the aspects were classified as computational issues i.e. Database structures, exchange formats, programming techniques, interface design, and architectural issues (cost calculations, facilities management, production drawings, simulation, evaluation building analysis, design synthesis, form generation, etc.). CADD researchers and developers have looked at issues from either the formal computer science point of view or the architectural design point of view in developing or designing new or appropriate CADD systems. A major challenge however has been to address and solve the problem of how to integrate architectural issues is what makes the distinction of CADD generations. Moreover Reffat (2006) and Kalay (2004) assert the increased frequency of emerging new ideas that have not been grounded on early work makes this process of evolution difficult. A computer systems classification has been established by the Design Methods Group of the Department of Architecture, Eindhoven University of Technology.(Salman *et al.*, 2008in Ola-Adisa, *et al.*, 2012). Their work has distinguished four computer systems in education which is listed as follows and illustrated in Figure 1:

- Social systems; defined as computer tools which all students should be able to use within any higher education curriculum.
- Professional systems; computer tools which are used in architectural practice (e.g. AutoCAD software). Usually these systems are off-the-shelf software, that is,

software developed by standard software companies (e.g. AutoCAD, 3DStudio, Microsoft).

- Educational systems; modified professional systems to convey specific pedagogical purposes and are developed within or for a specific architectural institution and sometimes are result from research.
- Innovative systems are computer systems that reach beyond current state of the art of professional systems (e.g. automated plan recognition, virtual reality design systems) and always are the consequence of research work; hence they are so-called home-made software (Achten. 1996).

In Departments of Architecture which have dealt with computer literacy and the CAAD integration concept, the Social and the Professional systems are the main systems in use depending on the institution's pedagogical approach (Achten, 1996in Ola-Adisa, *et al.*, 2012). In the Department of Architecture University of Jos, the social system is currently in use with a gradual evolution to include the professional system. An informal survey of the teaching staff further reveals that less than 10% make use of the other two systems; Educational and Innovative. This paper further examines the role of the two main systems (Social and Professional) within the architectural design studio curriculum of Department of Architecture University of Jos.

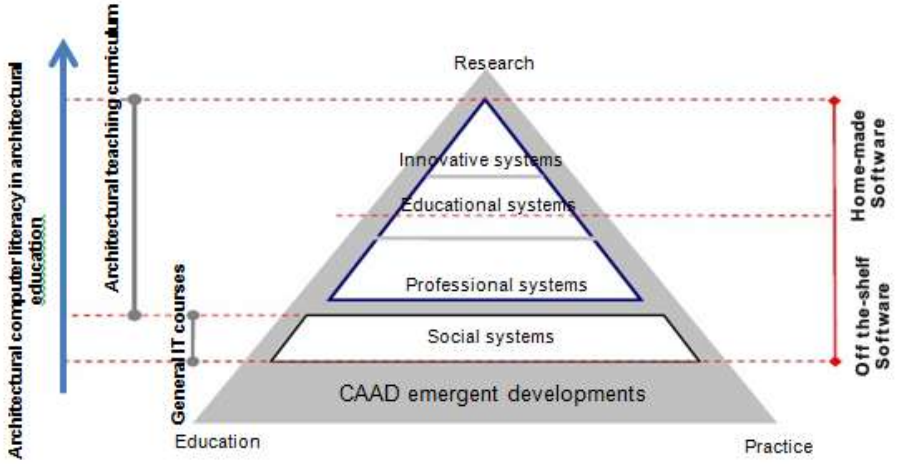


Figure 1: CAAD systems in Architectural Teaching Curriculum and Computer Literacy
Source: Ola-Adisa *et al.* (2012).

Computers in the Architectural Studio

There has been a three-fold effect of computers on the design studio, viz:

a. The Pedagogy
b. The Learning Environment (Studio)
c. The Studio Curriculum

The Pedagogy

It is evident that students are becoming increasingly better skilled and digitally literate. According to Bermudez and King (2000), they are imparting knowledge and are no longer leaning to the traditional context of architectural learning. Over the centuries of architectural pedagogy, from Ecoles des Beaux Arts to the Bauhaus, a constant feature is the way studios have been taught. This traditional way of teaching still exists and is the method being used in the University of Jos, Department of Architecture. However, the changing design media and the visual impact that each of these pedagogical methods can bring will change the status quo. Studies bring to bear the introduction of new media for design. CADD therefore opens new perspectives for design thought. In recent studies by Salman *et al.*(2008), the challenges have been extended to include the need to develop new skills, rethink architectural design education in the light of the new developments in CADD software programs, and how this might bring change to the traditional setting.

A recent survey indicates that almost a quarter of architectural firms in Nigeria use computer facilities for presentation, working drawings and e-mail, while around 30% of architects are computer illiterates (Prucnal-Ogunsote and Ude, 2008). Currently there is a need for Architectural Education to catch up with what is happening in professional practice where CADD is the only acceptable means of submission of projects and designs for Government and other high profile clientele (Ogunsote *et al.*, 2007) Therefore both the educator and practitioner have a similar goal in wanting a student who is fully competent (Harwood, 1989). According to Salman *et al.* (2008), Architectural practice is effectively improving the architects' traditional ways of design by digital technology integration. Whereas in academia, computers have been used in architectural schools to challenge the view of architectural practice; the architectural studio becomes the setting to examine the computers contributory role in architectural design. Therefore, CADD software programs continue to affect architectural thinking in a number of ways.

The Learning Environment (Studio)

According to Ataman, (1996), hand sketching and CADD visual techniques can be used in conjunction, rather than being treated as separate media. In three dimensional representations, students are increasingly seeing the benefits of the transition between the uses of physical models into computer aided modelling methods. The combination of techniques enable the students the opportunity to quickly examine and redesign their projects in a shortest amount of time with such CADD software programs e.g. Sketch Up, Photoshop, and AutoCAD. In the study of the 800 level students, the more successful thesis presentations were by those students who used a combination of CADD and manual drafting techniques. Therefore, the change includes various shifts in design media, visual thinking and design teaching theory. These media shifts go beyond the type of CADD program used e.g. AutoCAD etc., to include personal methods of integration and association between digital and physical media, 2D and 3D formats, e.g. Revit, Sketch Up etc. and any other media that assist the designer in concept (re) structuring (such as photography) and (re) interpretation.

Architectural Studio Curriculum

In the beginning, adding CADD to the architectural studio curriculum faced strong rejection by the studio professors, thinking that CADD skills would affect the students' willingness to acquire traditional drafting and design skills (Salman *et al.*,2008). Indeed even today; students of the Department of Architecture, University of Jos are still not allowed to make formal presentations in CADD. With time, however, both lecturers and students are beginning to develop an attitude of practical realism as they draw from the developments in practice. Moreover since CADD proficiency has become a prerequisite to employment. There is a significant correlation between computer literacy and its utilization, and the success of integrating computer systems with architectural education depends on the way we integrate and relate computers with architectural design and theory (Salman *et al.*, 2008). Most often, the proposed curriculum has not been successful in integrating computer literacy with design inquiry. This fragmentation was realized and brought together by the students. Students already make use of computers to present their various, reports, assignments and even seminars, engaging the use of word-processing, power point and other powerful graphic software. It was only a matter of time to gravitate to computer for architectural assignment solutions. Therefore it can be deduced that the effect of the computer in the studio is a function of the everyday use in other areas of life and its use as evolved socially and not necessarily as a learning tool. This effect has indirectly brought new skills and tradition to the studio context. In close interaction with the students, it is

evident that they still conceive their ideas through traditional drawing before using the digital media to produce their presentations.

Schenk (2005) opines that it would benefit students to develop their own personal approaches, and then learn how to use drawing appropriately for professional practice. While design curricula should apply more attention to the classic forms of drawing, digital media should be seen as an integral part of the drawing curriculum not the opposite (Schenk, 2005). According to Olotuah (2006), the goal of architectural education is generally directed towards the attainment of a humane and responsive environment). In seeking to achieve this, architectural education must be flexible and be capable of responding readily to changes in the field of architecture. Furthermore, the structure of the architecture curriculum should aim at giving expressions to and utilizing the factors of socio-economic and technological transformations in Nigeria. (Adeyemi, (1998) in Olotuah, 2006)

Design Process: the use of Sketching as a Medium in Design Learning and CADD

Visual communication is the main medium of expression in architecture. The architect (in training) makes use of drawings to process the design and proffer solutions to the problems presented. In the training of architects, different sources of information are combined visually to communicate designs. When applying graphic thinking, different graphical tools aid the architect in design. However, the evidence of the design techniques' convenience has to be made within the context of the individual design process which will evolve over years of practical experience (Salman *et al.*,2008). Lawson (2004) states that the development and support of individual design thinking is best promoted by the individual designer, in other words, architects have to be comfortable with their own methods of thinking in order to provide the most effective design solution while recognizing the importance of selecting the best tool, environment and method to suit their thinking style. Sketching is a form of visual expression for generating ideas and communicating ideas and visual expression is an inherent part of the creative design process. Part of the unique creativity of architects is that they are always open to new ways of solving design problems and viewing environmental issues. McKim (1980) states "….abstract and concrete imagery are complementary. The flexible visual thinker moves readily back and forth between the two". From McKim, it can be adduced that sketching involves exploration in design, analysing graphic images to gain a better understating of them It is therefore important in design to maintain an open mind and flexibility for effectiveness in the design process. Verstijnen, Hennessey, van Leeuwen, Hamel, & Goldschmidt (1998) consider hand

sketching and physical model making as the most important media of the idea-generating process, as digital sketches are argued to not support creativity in the conceptual design phase. It is therefore pertinent to note that the students' use of CADD in creating digital sketches and 3-D modelling are only using innovative techniques to increase effectiveness in creativity in the conceptual design phase. Researchers in recent times now recognize drawing within digital or physical platform, as the most elementary medium for design thinking. Schenk (2005) recommends introducing the traditional context to new computerized based drawings, since it can bring new beneficial effects to students, designers and researchers and enable them to have new insights and opportunities to visualize their ideas and to explore new forms of drawing, while Madrazo (2000), suggests digital visual representation can be used for an enhanced visual thinking medium. However, several academicians, of the view that this integration might have the potential to change the culture of such traditionally protected academic environments. Besides, a reduction in the use of traditional paper-based drawing could affect the development of visual literacy and creativity in design students, and lead to the predominance of particular software (Schenk, 2005).

METHODOLOGY

This study focused on the collection of empirical evidence in assessing the impact of CADD software programs on the conceptual phases of the architectural design studio and the effect they have on teaching and learning of architecture. In University of Jos Department of Architecture, the traditional methods of teaching are still employed, i.e. learning by doing. The department has a mini computer laboratory with 20 workstations, an interactive white board, overhead projector and alternative source of power. This lab is primarily for teaching purposes (CADD for undergraduate students) and students have limited access to this facility. The MSc learning scenario is quite different. The studio is equipped with drawing tables only. Students have limited access to the computer laboratory and own personal systems or business centres to perform their social, professional and educational functions. Students access a combination of though a large percentage of the students own laptops and make use of them at home where power source can augment epileptic power supply by their own sources of alternative power. The studio is then primarily a place to interact with studio mentors for those who can afford personal computer systems, and a place to work for those who cannot.

This study consisted of both qualitative and quantitative methods in two distinct stages. The first stage was completed using quantitative methods involving a paper-based survey of

final year (800 level) postgraduate students to ask them about their CADD use tendency in the studio, in relation to other types of media, i.e. sketching, modelling etc. Furthermore, this survey reflected how the respondent group had been taught to think of CADD programs in the studio setting. The second stage was conducted using observational methods and followed by conducting interviews at three different intervals during the course of their final year. This involved samples of their presentation work. Other qualitative data collection methods used in the study included informal interviews with students and selected lecturers of the Department of Architecture.

The observational study involved attending studio seminars (when students have to pin up their work and be reviewed by their mentors and other invited lecturers) and observing student's work through part of their design reflection in the studio and acting on those observations in relation to the conceptual design progress, to provide a "real-context" appraisal. The studio observations identified three distinct phases of design development that split data collection into: first phase data (study sheet stage), second phase data (after the preliminary design submission review) and third phase review (at the final design submission). Primary data collection was severely hindered by the insecurity challenges in Jos and the strike actions in the university. Consequently, the study stretched over a 36 month period instead of nine months. The interviews aimed to identify any association between the rationale behind design concepts and CADD methods (reflection-on-action) which students were using. Informal interviews were conducted at the end of each design phase of the process. Secondary data includes the visual representations of the student's design work. This data was important in providing hard evidence of the benefits that students had mentioned in the questionnaire survey. Furthermore, this data was useful to form part of the interview's inquiry at the end of each review.

RESULTS

Of a postgraduate studio class of 37, 23 students were surveyed and 100% of them presented the bulk of their work in manual form for seminar presentations. Of this number though, 35% manually retraced the 3-D CADD models for presentation. Typically, students presented their work in the seminar with tracing paper. Of the students in the study, 20% initially attempted to present their work as CADD drawings, while the remaining 15% presented line drawings traced over CADD drawings on tracing paper. In all stages of presentation observed, the students that used CADD for their design and drafting made bolder presentations and came up with stronger forms and building massing. The fact that the students were using A0 sheets was made easier through the plotting of their drawings using various CADD including software like CorelDraw for their preliminary sheets. The

sample population consists of motivated students that acquire access to computers at will in spite of the fact that they are studying design in a domineering traditional mode of teaching. The study shows that students' preference to obtain a laptop is higher than obtaining a personal computer. This suggests two things: firstly that there is an elective mode of using computerized environment and secondly that of free access to their design material anytime. Laptop's portability provides the student with aided storage and a copy of their designs reflective journal (medium for storing design digital material). Laptops also have the added advantage of long battery life (up to four hours) as opposed to a unlimited power supply unit (UPS) which may work for 30 minutes, and is indispensible with the epileptic power supply in the university environment. Moreover, the relatively high percentage of 84% who installed one or more CADD software program(s), gives students more opportunities to explore computer aided design environment as a design medium for their design reflection. The optional access gives the student an important source of learning and this could be related to learning by doing theory since most computer users (students) learn by trial and error (van Dijk, 2005).

Interviews were directed specifically to respondents who used CADD in their presentations. Students were subjected to interview and were assessed by their design skills (architectural design, sketching and CADD) on a five–point scale from weak (1) to excellent (5). Findings as listed in Table 2 revealed that students ranked as follows: architectural design skills mean score is good (mean score of 3 out of a possible 5) sketching skill mean score is good (3) and CADD skill mean score is good to very good (3.38) and this is the highest mean compared to the other two variables. These results suggest that students that use CADD have strong design skills and the use of CADD appears to give the students an edge at least in the presentation drawings stage. Figures 7 and 8 clearly demonstrate this. This aspect should be taken in consideration in curriculum review and inclusion of CADD courses. Additionally, from the interviews indicates the respondent's attitudes towards CADD through their preconceptions and experiences with respect to CADD usage. Most respondents that used computers used CADD regularly in the design process (80%), 75% of respondents used CADD in both the early phases and final phases of the design process, and 25% used CADD during the final phase only. 35% of the respondents tend to use CADD as a designing and drafting tool, 65% tend to use it as a drafting tool only. Although CADD has proved to be useful in presenting architectural designs in higher volumes than manual drafting, (see figures 9 and 10) 35% of the respondents also felt that CADD is a helpful tool in conceptual design, and solving design problems successfully; graphically communicating and gaining a better understanding of their ideas (see Figure 11). However, 75% of the

respondents reported sketching to be a very important activity to start the design process before moving on to CADD. The use of CADD has changed their sketching tendency, with 50% stating they tended to sketch less. At the same time, 66% of the respondent group consider learning CADD within an architectural practice is the most useful way to learn CADD as a design tool.

Figure 2, showing the distribution of the sampled population by gender, indicates that male students were the majority (70%) and female students were 30%. Figure 3 indicates that 60% of respondents own their systems while the other 40% employ the services of business centres. All of those who own systems have laptops and not personal computers. The distribution of the sampled population by mode of presentation in Figure 4 shows that 60% of respondents use conventional drafting methods. The distribution of the sampled population with computers by software use in Figure 5 shows that 65% of respondents used AutoCAD while 35% used other types of software. Figure 6shows that 75% of respondents used CADD for 3-D, while 25% used CAD for 2-D for presentation drawings. In addition to *AutoCAD*, respondents made use of various 3-D applications. *Sketch Up* represents the majority with 40% of the respondents.

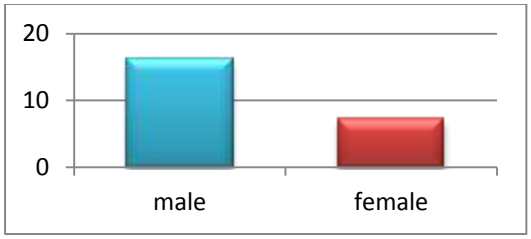


Figure 2: Gender Distribution of Sampled Population
Source: Authors' Field Studies

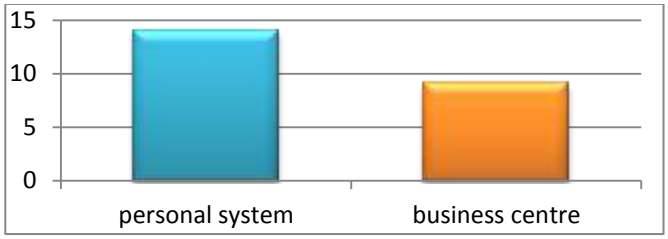


Figure 3: System Ownership of Sampled Population
Source: Authors' Field Studies

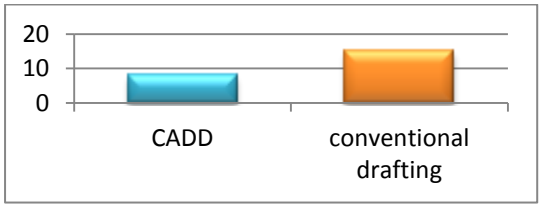


Figure 4: Drafting mode of the sampled population
Source: Authors' field studies

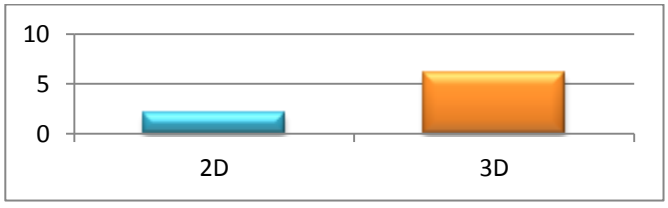


Figure 5: Presentation mode of the sampled population
Source: Authors' field studies

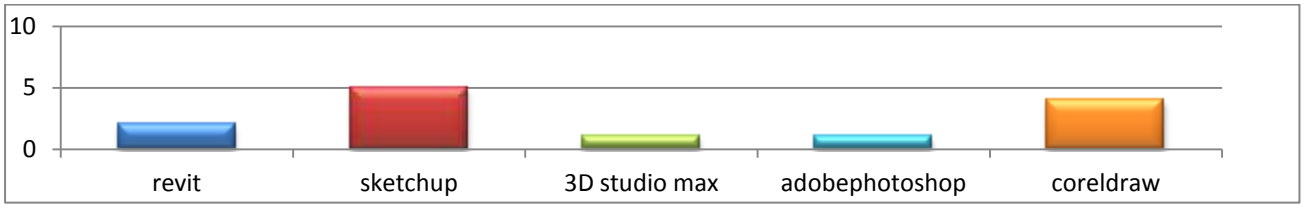


Figure 6 Distribution by software application use of sampled population

Source: Authors' field studies

Table 2: Summary of Assessment of Students' Skills

	Design Skill	Sketching Skill	CADD Skill
	8	8	8
1 (weak)	0	0	0
2 (fair)	2	2	1
3 (good)	4	4	3
4 (very good)	2	2	4
5 (excellent)	0	0	0
mean	3	3	3.38
median	3	3	3.5
mode	3	3	4
range	2	2	2

Source: Authors' field studies

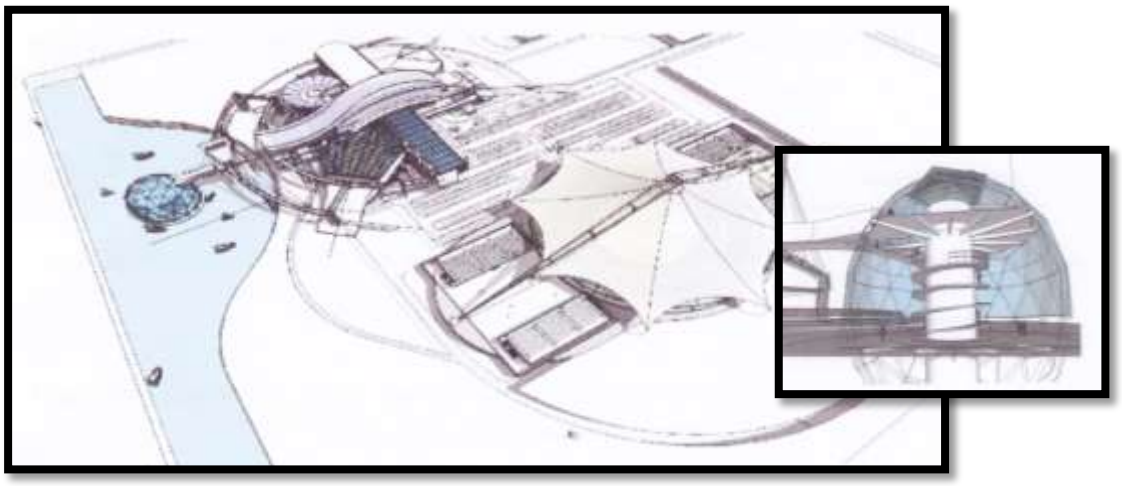
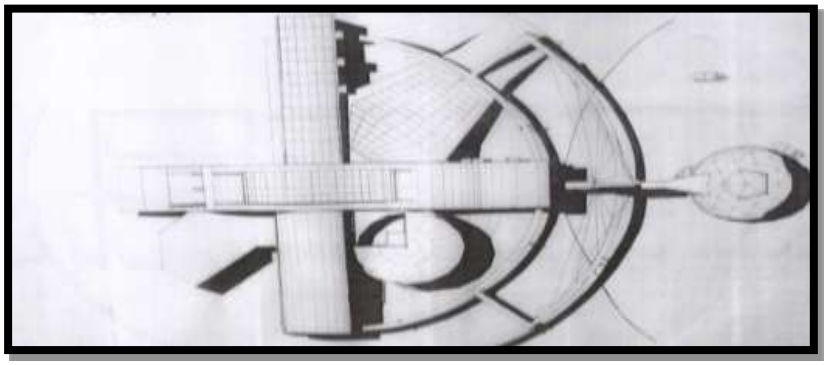


Figure 7: Students' 3 – dimensional CADD rendition of Expo Centre project
Source: Authors' field studies



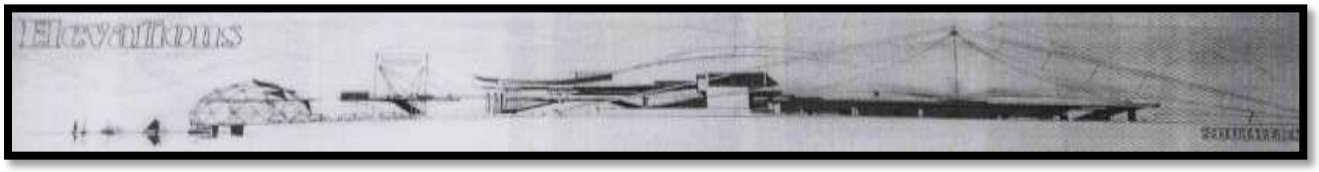


Figure 8: The same student's manual drafting of Expo Centre site plan and elevation
Source: Authors' field studies

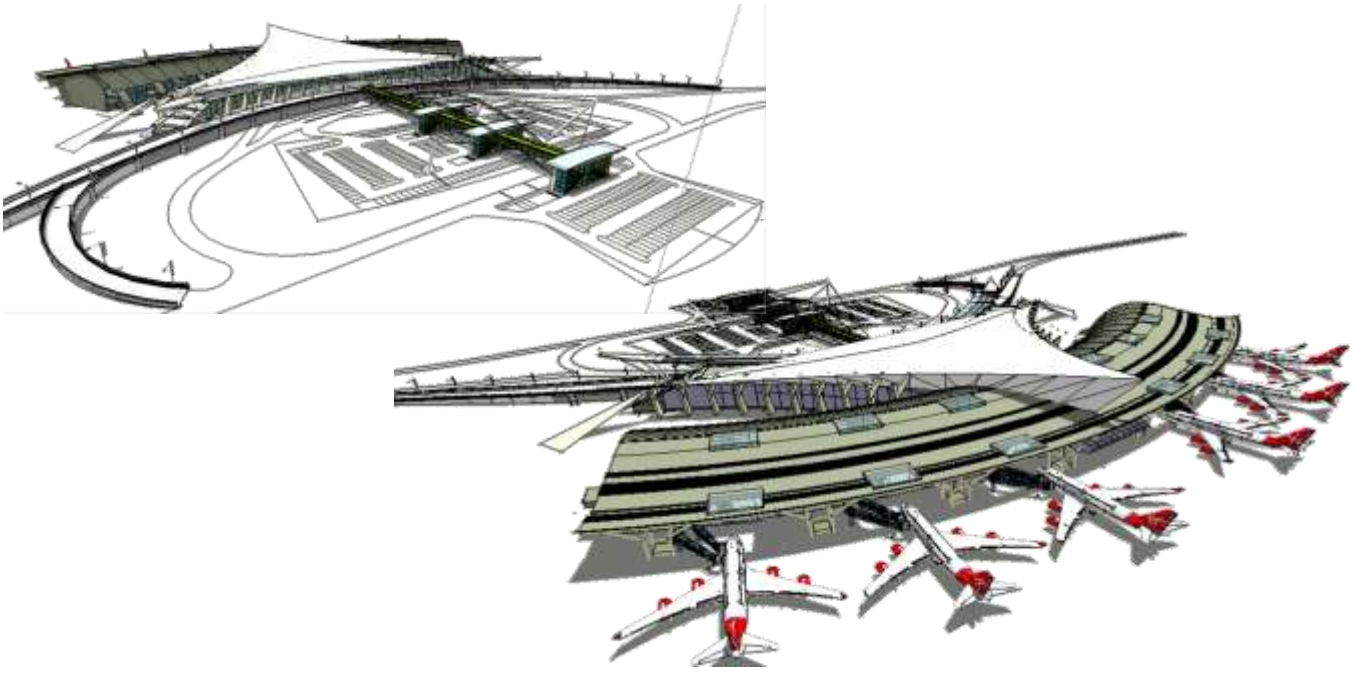


Figure 9:Front and rear view of Student's CADD 3-D Modelling of Airport
Source: Authors' field studies

Figure 10: Inset CADD floor plan and 3-D Modelling of Medical Laboratory
Source: Authors' field studies

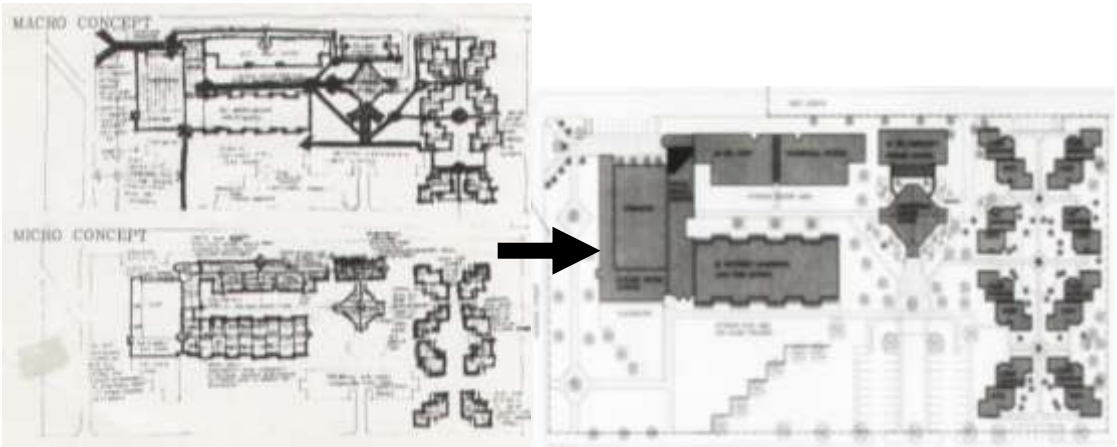


Figure 11: Free hand conceptual sketch and resultant CAD design
Source: Authors' field studies

DISCUSSION AND CONCLUSION

Although the respondents consider and perceive CADD software programs as drafting tools, CADD has affected their conceptual cycle sequences and consequences. As a result of this study, 30% of the students sampled were able to design and present their postgraduate

thesis projects aided by CADD in either conceptual, preliminary, final or all stages of the design process, The use of CADD, enabled them to move and make further decisions, as these CADD drawings assisted their form concept development and building massing. CADD came about because the drawings of the existing building were provided to students previously by the studio mentors who enabled them to explore and see the building's different elements (structure, surface and joints) schematically. Other aspects also mentioned included: trying different scenarios by repeating the analysis accurately and quickly, changing the drawing appearance easily (line weight) and doing the same task but in a different variation. Through the interview, the respondents showed a tendency toward using CADD as a tool to investigate form concepts. CADD was also a veritable medium of expression in architectural geometrical formation and the conceptual process.

The change in the study context includes various shifts in design media, visual thinking and design teaching theory. The relationship between architectural design thinking, representation and media is continual. Media provide the means for engaging in design thinking and progressing via various representational media (Breen, 2004). Although digital media has become an option, this does not mean that digital design should develop into a process, which excludes all other media. Other media, scale-models and sketches, address different sensibilities that better capture other aspects of design. Moreover, the observational data showed that, students are willing to use CADD at any point of the project where there is a need for accuracy, neatness and speed. This could be related to design 'talk-back' reflection. This case study confirms the need to integrate CADD into the drawing curriculum not the opposite. This gives another example of how students have a tendency to apply conventional design skills to any other visual media. The combination of physical and digital media and design methods added insights and better means to (re) consider and (re) fine a design. This possibility opens up new opportunities in architectural education as well as in architectural media research (Bermudez and King, 2000). At the present time, the personal laptop has become commonplace at the studio, so instead of carrying a sketchbook, students are carrying and working on their laptop. It acts as an e-sketchbook that includes various aspects of their conceptual ideas and could include: CADD drawings, scanned-sketches and digital photographs. It houses all types of media that saved digitally to form a reflective journal of their design projects and precedents. Although, they might use various CADD software programs to reach the result of this imagery process, it is still housed in one e-book. This is similar to what students had practiced for many years, in recording their ideas by sketching.

Since the central issue in architecture is the quality of the human habitat, enhancing the activities of the inhabitants, which naturally results in wellbeing, growth and self-realization, as earlier posited by Olotuah (2006) and further strengthened by the findings, Architectural education is thus an important tool in sustaining the health and general productivity of the populace and thus in the achievement of a great and dynamic economy. In order to achieve these virtues, architectural education in the country must be able to decipher global trends in architecture, especially as they relate to Nigeria's socioeconomic and political circumstances. The use of computer technology in the design and construction of buildings is in line with current global trends. The reality of the use of CADD in the workplace makes it imperative for architects in training to be computer literate if not proficient upon graduation and entry into the labour market Furthermore, this study was able to clarify the effects of computer on the traditional context of the architectural studio and how to reflect CADD on the teaching method taking in consideration the primacy of drawings as a medium for design. There is therefore a need for a holistic computer curriculum for Nigerian schools of architecture is required with a clear distinction between regular courses and components integrated into studio and practical courses. The professional bodies regulating the training and administration of the profession should be more proactive by further developing their websites, as these are the potential places visited often in the process of e-learning (Prucnal-Ogunsote and Ude, 2008).In securing a future for the architecture industry, educators must respond to changes in technology, management, service orientation, and the legal recognition of the profession. Universities and other higher institutions should therefore study these options and lead the way in by equipping graduates with abilities to use applications that will offer professional practices with various choices that best suit the design and construction industry. The Minimum Academic Standard (MAS) recommended by the National Universities Commission should be revised to make it mandatory for architecture students to become proficient in Computer Aided Design before graduation. The curriculum of architecture programs should reflect both contemporary and future trends for society and industry in computer use.

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