



ABSTRACT

Information and Communication Technology (ICT) policy in Nigeria has been increasingly threatened by the roles played by stakeholders largely due to the non-implementation of the desired guidelines necessary for achieving the set goals. in the nations educational institutions. ICT policies aimed at achieving the goals of education through

A PPRaisal OF (ICT) POLICIES IN NIGERIAN HIGHER INSTITUTIONS: TOWARDS ADMINISTRATION OF SUSTAINABLE ARCHITECTURAL AND ENVIRONMENTAL EDUCATION.

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INTRODUCTION

Institutional policy agendas in Nigeria are increasing focusing on the need to integrate information and communication technology (ICT) in our institutional system. These technologies provide an opportunity for institutional administrators to manage school information more efficiently. Institutional administrators are the central forces in tapping the learning opportunities created by the introduction of ICTs. The key to what, where and how teaching and learning take place at schools and within the communities (Mankilik and Agbo, 2006). ICT is guaranteed offers the opportunities of revolutionizing teaching methods, expanding access to quality education and improving the management of institutional system (WorldBank, 2002).



training that was considered essential in enhancing the efficiency and expertise of professionals in the education sector. The global pandemic associated COVID-19 turn around the trend in handling, utilization, and maintenance of these facilities, now it became evident that conferences, symposium and meetings are hosted online using zoom, Microsoft Teams, etc, all dependent one's technical ability. This paper reviewed the existing (ICT) policies of Nigerian education sector with specific emphasis on Architectural education in the nation's higher institutions of learning and relates ways on how these policies could sustain the administration and development of Architectural education in institutions and the knowledge base of professional Architects. It highlighted the roles of stake holders, government, educators, corporate organizations, international organizations, professional bodies towards attainment of desired objectives. A case methodology of using ICT tools was presented in studio design class formation and presented in order to test the existing policies framework. Challenges and problems of policies implementation by stakeholders were reviewed. The study concludes by recommending the need for provisions, applications, and utilization of facilities to all schools of Architecture in the nation's higher institutions, also instructs on efficient monitoring, training development and enlightenment on (ICT) knowledge to students and lecturers and timely reviews of curriculum. Enforcement of policies specifically in higher educational institutions will help promote the sustainable development of Architectural Education.

Keywords: (ICT) Education, Architectural Education, Policies, Stakeholders and Sustainable Development.

Administration according to Hornby (2002) is perceived as an activity that is planned, organized and successfully run a business, school or in institution, it can be a process or act of organizing the way something is done. Potentially, the principal factors that offer smooth running of



activities in an organization for achieving the set goal in every institution is through effective and realistic administration that is well sustained.

Administration according to Edem (2006), involves planning activities which aimed at the fulfilling the goals of a particular organization or institution. It calls for the ability of the administrators to make the right decisions to fulfil the required goals. In institutional setting therefore, administration has been extended as a service activity or tool through which the fundamental objectives of the institutional process may be more optimize efficiently when allocating human and material resources as well as to make the best use of existing resources.

Information and communication technology (ICT) has been defined by various scholars from different perspectives. Mansell and Silverstone (1996) defined ICT to include electronic network-embodying complex hardware and software-linked by a vast array of technical protocol. It is a generic concept which refers to technologies by which various forms of information are collected, stored, and edited (SER, 1977). It is also explained as multi-media application involving a combination of data carriers such as CD – ROM, Video, Floppy disk, internet, and other software in which possibility for interactive communication is offered, (Smeet, 1996). However, ICT equipment are facilities, tools or resources that could be used to process, store, preserve, access, retrieve and disseminate information with ease. It could be seen as the engine for growth and tool for empowerment, with profound implications for education, change and socio-economic development.

The dream of any institution in an effective and efficient managerial process to accomplish their needs and goals. Ohakwe and Okwuanaso (2006), contented that versatility in knowledge of computer application software's in use and execution of various application such as spreadsheet, excel, computer-aided design, and database are important skills in delivering sustainable institutional ICT administration. Every complex of institutional system requires more ICT technology demand from the institutional administrators take care of data processing relevant information for sharing across the institutional agencies for



decision making towards quality assurance and transformational development.

Institutional administrators need to have basic information of students and teacher, flows of goods and supplies, and the rate of spending on various inputs, to make the most basic resource allocation and decisions. In this context, however, for institutional administrators to deal with the huge pressure faced in the institutional administration, Iwu (2003) categorized the use of ICTs into the following for effective and efficient services:

- i. **Sensing Technologies:** This equipment gather data and translate them into form that can be understood by the computer, such as scanners, sensors, keyboard, mouse, electronic pen, barcode sensors or readers, touch of digital boards, voice recognition system etc. They could be used by the institutional administrators to do computation and processing of paperwork. These sensory technologies gather data to do complex computation very rapidly and accurately. Similarly, through word processing they enable them to draft, revise and produce reports of high quality at least in terms of presentation without much hard labor, frustration and time waste.
- ii. **Communication Technologies:** These are equipment that the institutional administrators could use to transfer information from the sources to users. They can overcome natural barriers to information transfer like speed and distance. These include facsimile machines (fax), telephone, electronic mail, telecommunication system, teleconferencing, electronic bulletin boards etc. In Nigeria especially in the Niger Delta region, there are lots small islands, and sometimes the institutional administrators in the region work together. To travel to meetings are very expensive, so virtual meetings can be use instead. They use free software such as skype. It is a



useful way of communicating and saves time, risk and a lot of money.

- iii. **Display Technologies:** These are output devices that form the interface between sensing, communication and analyzing technologies and human user. These include computer screen, printers, television etc. At first, some of the display technologies are seen as luxury but some of the institutional administrators after realizing what it could do began to see it as a necessity. Every computer in the institution has to be connected to the internet. The office of the institutional administrators is open to the public, to researchers, staff, students and parents wanting information about the institution. They can find all of that information on the internet. This makes the work easier by reducing the flow of people through the office and improves access to information.
- iv. **Analysis Technologies:** These are the technologies that help the institutional administrator to investigate of query of data, analysis, and in-depth query for answers from simple to complex phenomena in administrative procedures. A complete set of a computer system could be a micro, mini, mainframe or super scamper. ICT has changed the way in which institutional administrators collect and analyze data. For instance, the use of Access, excel and other simple applications to collect, store and analyze information. They may also need some sophisticated packages like SPSS (statistical package for the social science). This is to improve the timeliness and volume of information in implementing an institutional management information system.
- v. **Storage Technologies:** These technologies facilitate the efficient and effective storage of information in a form that can be easily accessed. They include magnetic tapes, disks, optical disks cassettes etc.



The Role of ICT In Institutional Administration In Nigeria

Ideally, when institutional administrator harmonized both material and human resources a lot can be achieved in growth, the relationship of the two provide a synergy for gaining speed of executing work in confidence within the institution framework. The ability of an administrator to use and access the ICTs appliances will improve administrative efficiency in many ways:

- 1) **Organization of information:** Institution administrators need to have basic information on students and teacher flows. For example, data categorization for student/staff based on sex, class, state of origin, performance in schools etc. The organization of data into an easily accessible format such that can be easily stored and retrieved from the computer or ICT facilities. And this will be more effective if staff knowledge in using the facilities is regular.
- 2) **Computation and processing of paperwork:** Used for planning/mapping out activities of the semester from day one to last day of closing for break. The number of weeks for revision, real teaching, conducting of continuous assessment tests, examination periods, and when the result could be released to students. Activities such as stipulated time for teaching practice and student industrial work experience scheme (SIWES). The use of MS-excel and other simple applications to collect, store and analyze information for the teacher's roles assigned such as setting up of question papers, marking, moderation etc. It helps in keeping records of events, enhancement of effective happening in the institution, issues out notice of meeting for staff, students and parents which can be accessible through utilizing ICT facilities.
- 3) **Enhancement of effective communication:** This involves the use of telefax and communication facilities. with the installation of computers and internets communication is made easier. Iwu and Ike (2009) opined that ICT has rendered international boundaries irrelevant since many modern activities cut across international frontiers. We now live in a boundless world that is becoming a



smaller place, due to the recent development in ICT. Institutional administrators use ICT for improved communication as a process of transforming thoughts, the sharing and imparting of information, growing and receiving and understanding of message within a network of independent relationship.

- 4) Enhancement of planning: The database is established through the organization of data on various elements of the institution such as student, staff, resources etc. This could be used by institutional administrator to plan and make decisions based on accurate and readily available facts. He budgets the school expenditure and plans for replacement of both obsolete and repairs of broken-down equipment or institutional facilities.
- 5) Improvement of monitoring: Institutional administrators use microcomputers in monitoring various areas in the institutional system, such as the uses of continuous monitoring and assessment of students learning and achievement in the institution. Campbell and Sellburn (2002) pointed out that ICT can be valuable for storing and analyzing data on education indicators, students' assessments, educational, cost, human, and material resources.
- 6) Managed instruction: This is an approach by the institutional administrators to use computer in scheduling courses/subjects, space, installation, inventory, and personnel control, recording and reporting attendance, school accounting, storage, and retrieval of student information marks management. This can generate the demographic data of students and institutions staff, production of results online, retrieving on lecture timetable online and enlisting of courses and registration through online.

The Challenges of the use of ICT in Institutional Administration in Nigeria

Most higher institutions in Nigeria are still using the traditional paper-based documentation system which slows down the method of



processing of documents, filling system in keeping records, and delay processing of documents in teaching and learning and designs production. However, there exist various benefits offered using ICT in easing many facets of human life, there are still challenges to its utilization in developing countries like Nigeria. Gbenga (2006) stated that many institutions, in Nigeria have shortages of computers and ICT accessories and there are gross inadequacies of internet supports, WIFI connectivity, these are important requirement for supporting networking for learners and teachers of higher institutions in developed countries.

To develop institutional administration, there is need to exchange information between the lower echelons and the central level. Schools and departments are far from central core providers of the networking services, because of the existing gap. There is no well-developed ICT network, and the institutional system is suffering because of it. The infrastructure is not there; it needs investment and commitment from the government. The problem of poor infrastructural facilities especially erratic power supply has been the major cause of poor usage of ICT in institutional administration. The institutional administrators need to raise awareness about the potential of ICTs, particularly to improve communication. Now, people are not ready. They are not exposed to new technology and institutional administrators do not provide training for them. They do not have expertise in the field of ICT.

In recent years there has been a move towards introducing ICT in every teacher training programme. Even private higher institutions are required to have ICT departments. Designing a separate ICT policy for institutions will require special attention, but it is imperative for countries like Nigeria. As identified by Gambari and Chike-Okoli (2007), Nigeria is not fully part of global University System (GUS). The GUS is an initiative to educate students through a satellite of wireless telecommunication infrastructure, mostly using internet. NITDA is now meeting this requirement by providing facilities, technical support reaching out to many institutions in the country. Other governmental



agencies on this same task include, NCC and now Ministry of Communication and digital economy these have changed the narrative and became singular giant support by the Nigerian government to vital institutions in the country. However, spending on ICT differ considerably between countries and is related to their level of development. Lack of proper acquisition of ICT resulting in low utility, low ICT skills, inadequate supporting infrastructure, and high cost of maintaining and servicing equipment are all challenges in the institutional administrative activities. Unegbu (1999) lamented that high cost of purchasing and replacing the ICT facilities and high cost of training results in low ICT skills in most institutions this became a major challenge. There are huge shortages of technical/skill manpower in ICT in Nigerian higher institutions. Maintenance of faulty equipment let many of these facilities abandoned since there is also little knowledge of repair.

To provide solutions to these challenges, definitely there is need for stakeholders to comply with the existing policies and new policies will be required. There should be policies to facilitate the use of ICT in the institutional administrative set up, to allow workers to develop their capabilities, and to improve work processes. There must also be policies at the institution level to better integrate ICT in the curriculum and to provide equal access to ICT for all students and staff.

There is need for the new policies proposed to address the sustainability of ICT initiatives. The government should effectively monitor these policies guidelines like NUNET, school-net projects etc. that were not properly monitored before should be strengthen. Sustainable policies, that are essential should be given many priorities and regards.

Effective incorporation of ICT in train the trainer programmes and courses are desired in line with global sustainability practice seen in most developed countries. This can be provided through Inservice teacher training and staff development programmes for institutional administrators. School participating in the integra project received specific teacher training and had to design teaching proposals integrating ICT through seminars, workshops etc.



In addition, there should be proper access and connectivity, particularly in rural areas. This requires a concerted effort on the part of regulator, service providers and institutional administrators. The institutional administrators also need to maintain a good working environment for their staff, student, and community as to promote ICT growth and maintenance. Too much attention has been paid to the technology itself and not enough to its application to the institutional system. Perhaps incorporating ICT in institutions should be considered as a process of cultural change within the institution, as it implies new ways of seeing and being seen, as well as new ways of thinking and acting. Finally, lack of finance prevents us from making as much progress as we would like. For example, many of our institutions do not have computers. There are always conflicting priorities when financing is scarce. To effectively integrate information and communication technologies in our higher institutions, it is important first to commit more resources, and second to use rational criteria when allocating equipment and providing training and staff development for institutional administrators.

Design education with respect to the ICT technology

When the computers' aided design was first introduced in the teaching system of many Architectural higher institutions of the country, it became too obvious the architecture education continues to advance, in both the use and application of 2-dimensional and 3-dimensional design presentations and this has greatly influenced the building construction and true reflection of the building practice could be seen demonstrated very clearly. The use of ICT tools within the architectural offices came much later than in any other engineering discipline. Computer aided design (CAD) programmes like AutoCAD (2D) format were used to produce designs and services drawings for electrical, mechanical, and civil engineering works. Later the other 3D programmes were introduced. The development of the first 3D programmes was realized in early 60's. But the real commercial introduction of the 3D



programmes became faster with the abundance of Personal Computer (PC) development in the 90's. This has to do with the huge new use of PC's seen in many architectural firms and offices. The initial 3D programmes were running only on workstations and generally with operating system as Unix. They were more expensive than the PC's and for that reason their use was limited to some medium size enterprises, architecture offices and private users. Looking back to these historical developments of computer use in the architectural education, these computers are used as a tool for many of the following purposes:

- a) Information processing tool
- b) Communication tool
- c) Visualization tool during the creative design process
- d) Presentation process

They are mainly used into processes such as design animation, simulation, and the whole spectrum of visualization. These 3-4 categories of computer use have the purpose of improving quality and efficiency of the building and its process.

By the developments of advanced 3D visualization tools and the developments in the field of Virtual Reality (VR) techniques, we can state that there is enormous improvement comparing with the other subjects, in these above-mentioned fields (except the VR techniques for architectural use).

The aim is to appraise the need of integrating ICT tools and computing in architectural education for sustainable development. By demonstrating a genuine guideline for the future direction and developments and identifying usage of ICT tool in the key design subjects of architectural education for the future. There is the need to adopt new robust policies and guidelines that can realize the goal in using all ICT and computers facilities as a reliable design tool for sustainable development in Nigerian higher institutions of learning.



Computers is nowadays not only a tool for the architects but for general use and operation that requires system integration and application. Computer and many ICT related gadgets are used for architectural design process, next to the use of any traditional tool, the computers are becoming a valuable media for designers, architects, and engineers. The increase widening of Internet opened the horizon that computers became more and more a medium used for speeding up this ongoing process. Today it is difficult to imagine an architectural practice and architecture office that is not making use of this new medium. It became inevitable essential and crucial tool and the internet as communication media for any successful office. There is a growing need for tools that enables architects to cope with the increasing complexity in design and with the increasing need of efficient communication with many partners in the building process. Computers are very suitable for fulfilling these needs.

In the very near future, the computers will be even more than a medium, they will become a reliable partner. How can they become a partner the current global pandemic of COVID-19 has instituted an additional guideline in the design and built environment sub-sector because handling computers and related ICT facilities under requires new approach due to the nature of corona virus disease and how it affected the way people living in indoor or outdoor environment and health and wellbeing? The pandemic has led many people to stay at home, work from home under restriction and in compliance with the social distancing regulation. These guidelines associated with usage/handling of computer tools and other electronic facilities stipulates that any form of handling or contact will ICT facilities by persons require sanitization. Established guidelines were provided by ASHRAE and CIBSE TM, as a global USA and UK base building regulators to reduce the spread or contamination since it is



proven scientifically that contact with such facilities are major ways of contracting the disease. The ICT tools will be used as:

- i- Knowledge Integration tool
- ii- Decision Support tool
- iii- Design tool, especially for the built environment professional or student of higher institution.

FUTURE PERSPECTIVES OF ICT IN ARCHITECTURAL EDUCATION

Soon by the ongoing developments of ICT, we as designers and professionals who educate the designers on the field of Computing in general, need to think thoroughly and adapt ourselves to these rapid developments. Up to now, in most of the CAD education at the faculties of architecture, more attention is paid to the visualization uses above other aspects such as communication and information processing uses as it is mentioned above. We are now in the stage that the technological developments allow us to look forward and go a step further than only the present use of those tools in education. It is necessary to start from the very first year on, to give education on the development of the tools, which is mentioned as category 4th, 5th and 6th. Namely to develop tools which one can integrate his/her specific knowledge to a computer model and to built up this model up to the specific needs. At one hand, the way, which is being done, has to be further developed and continued. The student must get the knowledge and ability to coop with the existing hardware, software and to use them as efficient as possible and to integrate the use of it in own design to reach better results. On the other hand the level of education must be push up to the higher level. To the level that the use of computer as a partner in knowledge integration and for a support environment during the design process.

If these developments will be left to the others than architects, the architects will face with the danger that they will be the *slave* of the tools and not the *boss*. Partially we face the same kind of problem at the moment with the commercial tools. None of the commercial CAD



product supports the designer, as it should be. Each program has its advantages and less advantages or disadvantages. The user must have to learn the basic principles of CAD software to be able to use the needed program and take the advantages of each to use it in an efficient way. This basic knowledge should be given form the first year on to the architecture students.

METHODOLOGY

An educational teaching approach of given student a design of a house was adopted as a methodology. In a normal class structure students were divided into 5-groups to use the available building information management BIM, tool as effective method of design production and delivery. This methodology is a process of integrating the ICT teleconference tool towards developing the students ability to use the tools in design interaction, discussion and production the process are both experimental and technical.

An experimental Learning by Integrating ICT Tools

During the last couple of years there are many experiments conducted by design lecturers to test the student's ability in application and handling of BIM tools on collaborative design approach by year 2 students of the Department of Architecture, Faculty of Environmental design, Federal Polytechnic Kaduna. The design lecturer introduces this collaborative design approach and set-up group design process in design studio course.

- **Task 1**

Allowing each group to choose their desired software among the available computer design software such as AutoCAD, Revit, AchiCAD 3D-Studio Max, Twin Motion and Photo Shop by students to develop 2D and 3Ds design of 3-bedrooms, which at the end of the semester they will present and the task will be recorded as the assessment.

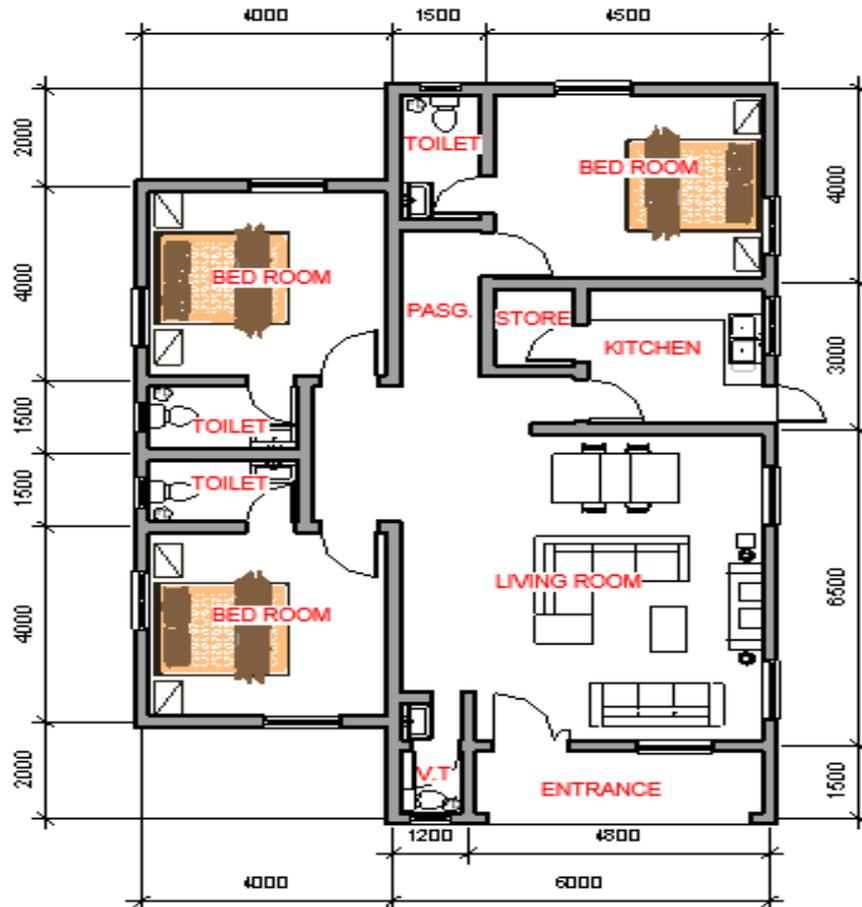


Figure 1. Plan & Elevation view of 3-Bedrooms of the house design using Revit

Source: Author Design, 2021

- Task 2

The purpose of this task was integrating the above-mentioned ICT tools together in a design exercise. The students group were asked to make their own design following a certain program of requirements, (which was a house in this case). Then to discuss by means of video conferencing, about the various alternatives, which was produced by each individual student and to choose the best one to continue. The students and the teachers from various universities worldwide participated in this discussion and gave their opinion by means of video conferencing possibilities on computer via the Internet.



Figure 2. 3DPerspective view of the same house in BIM Revit
Source: Author Design, 2021

The goal was **learning by doing**. While the student was works for a design, he had to cope with various techniques and tools to present the design idea and use of new communication technology and the Internet.

THE WAY FORWARD

To achieve effective upgrade of ICT facilities for architecture students in our institution's efforts should be made by stake holders in stressing the need to learn the technics of using computer and ranges of applications through teaching and training. It was mentioned before, computers can be used as a tool for visualization, communication, and information processing purposes in the architectural design process. Today computers have been used for various design using ranges of applications, computers can serve as a knowledge integration tool and a decision support tool that can supports architects and engineers in diverse and entire design process. This form of approach can boost the architects' training skills. Therefore, there



is a crucial need to upgrade the knowledge of architects especially with regards to ICT knowledge at institutional levels.

To reach this goal there are 2 ways to be followed at the architectural departments and faculty staff to demonstrate high levels of efficiencies and yield desired output:

- A. The non-informatics teachers, teachers from the other disciplines of architecture such as building technicians, interior specialists, urban planners, should be trained on the field of informatics applications for architects to upgrade their knowledge on Information and Communication Technology. They must be aware of the possibilities and impossibilities of the existing tools to be able to guide the students in the right way. There are still design teachers who do not have any knowledge about computing. That 's why they do not stimulate the students to come further on the field of informatics applications in the design process. On the other hand some of the teachers are so enthusiastic to see the results of computing that they cannot see the real design quality of the student in order to judge it objectively. When we can reach the point where the teacher himself can criticize the student work objectively, then we have also reached the point where the student has the attitude to discuss openly the possibilities and the shortage of tools. She/ he will then be attributing for the improvement of the tools.
- B. The second way, we state that the student must be able to develop his/her own application up to the certain needs in a limited way. The student must be able to discuss and to communicate with the software engineer to formulate the needed requirements. This is a very important attitude which students have to reach during their study. It is not meant that architecture student will become software engineer, but the future architect must be able to define his/ her own needs and requirements concerning the used informatics tools. The



necessary knowledge should come from the architect to built up a computer system or a building model. Therefore, the architect has to have certain level of informatics knowledge to reach that point of communication.

Therefore, we implement for the first years architecture education to introduce programming languages as JAVA and the internet technology such as HTML, VRML etc. besides the existing applications like CAD software. On later years, the students should also get knowledge on the use of new Artificial Intelligence (AI) Techniques and get introduction about the techniques such as Neural Networks and Fuzzy Logic.

CONCLUSION

It is quite obvious that for institutional administrators to function efficiently and the institution to effectively pursue its academic excellence, the use of ICT is needed. Based on this, several measures are necessary to improve the use of ICT in our higher institutions. Such measures as creating ICT awareness, and effective training of the institutional administrators as well as making available necessary ICT facilities.

RECOMMENDATIONS

- As in the architectural practice, the education at the universities is changing by the influence of ICT technology, the policies on use and application in design should be strengthens.
- Institutions and faculty staff should be trained on the use and application of ICT facilities available to them for the training of students at different levels of educational development.
- The existing visualization tools in architectural presentation globally have reached a climax, example can be seen in work-through presentation of design, 3D Models



printing that gave realistic views of design and construction accomplishment.

- To strengthen the policy Architectural education in institution must be directed more to the level when the student uses the ICT tools for knowledge integration and the decision support environment to use the computers as a reliable design tool.
- The student must be able to develop her/his own programmes/software for research purposes when they are well trained in computer application at grassroots levels.
- Collaborative design, interactive way of communication in the design process will serve as the future of the building delivery, project management and professional practice.
- Government intervention by boosting and upgrading communication receptors; 4G and 5G upgrade are ongoing developments in the ICT and the Internet technology laws, regulations will strengthen the nations education sector and increase sustainable development.

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