ICT Usage and Proficiency Level of Architectural, Engineering and Construction (AEC) Industry Educators in Nigeria

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Abstract
AEC Industry educators occupy are major players in the adoption of ICT in the construction industry. The usage of and proficiency in industry specific package by construction educators is bound to exert multiplier effect on teaching and research. This study attempts to examine the access, to and use of ICT facilities, by individuals and institutions, the training and proficiency levels of the educators. The study employed a survey research design, drawing a stratified random sample from Nigerian educational institutions, offering construction education. It was discovered that majority of the educators did not receive formal ICT training as institutional support appears to be weak. Their level of proficiency was very low for industry-core-IT packages, whereas there was a high level of proficiency in computer based communication media. There is need therefore for high-level institutional support and programme of training the educators (TTE) towards the capacity development of the AEC industry professionals to take full advantage of ICT and consequently improve the efficiency of the industry.

Key Words
ICT proficiency, computer usage, ICT training, Architectural Engineering and Construction Industry educators, Nigeria.

1. Introduction
The use of IT in AEC industry is still in its infancy in developing economies like Nigeria. It can be predicted that it will be turbulent for some years. This turbulence is due to increasing pace of changing technologies, which appear unmatched by the level of provisions for the training of the industry professionals by the traditional institutions. The capacity to deliver is weak while the demand for IT use will continue to be on the increase due to client-led demand, other –sectors-driven demand and globalization challenges. The education of a nation's construction industry educators must take into account the inevitable challenges that globalization has brought on the AEC industry.

The colleges and universities are known to be the developers of intellect and leadership. In view of globalization, the current traditional mode of education must reflect the potential of IT. To what extent has traditional institutions effectively meet the twenty-first century needs? What are the reflections of the incapacities of our institutions? There is need to reconstruct the existing institutions while we create new ones with the eyes on the future riding on the crest of IT.

Oyediran and Odusami (2004) examined the state of the art of computing by Quantity Surveyors (QSs) in Nigeria at the turn of the last century and observed that there is the need to examine the capacity of the industry educators as a necessary input in designing relevant policy strategy for the industry's IT take-off. This is a necessary step in closing the government policy-implementation

gap (Abimbade,1999). Noble (1998) believes that training is central to the adoption of IT and to overcoming the difficulties that may arise as a result of its adoption. Rebolj and Menzel (2004) were right in observing that an important reason for not using IT in construction effectively is education related. They further pointed out that graduates are powerful agents of change and technology transfer in the industry. A major factor in IT adoption in the construction industry is the inadequacy of human resources, experiences and the current education practice (Rebolj and Menzel, 2004,Hua, 2005). The industry need highly educated professionals who posses relevant knowledge and understanding of the systems and processes. A shift in education system is not only overdue (Stallings, 2001) but an examination of the IT incapacities of the institutions is indispensable. This will require auditing of both physical and human resources.

This study set to gather and analyze baseline information about usage and adoption of ICT in the AEC industry educators in Nigeria. It sought to understand the proficiency level prevalent among the educators with the aim of determining the policy directions that will promote better rate of IT adoption that will facilitate the performance of the industry particularly with the globalization challenges threatening the developing economies. It is to further discover the training challenges faced by the educators

2. Methodology

The research is designed to obtain information from those involved in teaching/research in construction related fields in tertiary institutions in Nigeria. The sampling technique employed is purposive. The data generated were analyzed using mean item scores to generate ranking of the variables of interest using the following formula.

$$I_u = \sum_{n=1}^{5} k_i n_i / n_x k \text{ ,}$$ Where k_i = Rank of event i. and n_i = Frequency of event i., I=Index of the specified event.

The events measured are: the proficiency of the use of various computer packages, the level of awareness, the level of deployment of computer in teaching and research, the factors affecting computer usage.

The modal age of respondents falls in the 41-50 years category, while the respondents spread across the professions in the built environment .The average teaching/research experience of respondents is about 11 years, while majority are in the middle lecturership grade. The respondents were drawn from five categories of educational institutions, categorized by ownership.

About 94% of the respondents indicated that they have been using computer/word processor in connection with their academic work, while about 47% claimed to have been using computers in the last five year, and only about 19% have been using computers over ten years ago. Their use of computer is mostly in the office (89%), at home (49%) and in cyber cafe (40%). About 71% indicated that they use computer every day. Access to computer is predominantly through personal purchase (78%) while the office accounted for about 13% access. Institutional Ownership of computers is very poor. The surveyed average computer ownership by the institution indicated that there are about five computers per respondents.

3. Results Analysis and Discussion

About 29% of the respondents have intercom facilities while about 20% have Intranet access. The intranet and video conferencing facilities are very low. The local area Network facility (LAN) is below 10% (Table 1).

Table 1: Possession of IT products and facilities by the departments

Facilities	Possession	%
◆ Local Area Network	5	7.35
◆ Internet Access	18	26.0
◆ Intranet	1	1.47
◆ Video conferencing	1	1.47
◆ On line data bases	0	0
◆ Reprographic machines	6	8.82
◆ Tele-fax technology	2	2.94
◆ Global System of Mobile Communication	7	10.29
◆ Intercom within the institution	20	29.41
◆ Voice mail	2	2.94
◆ Interactive video	0	0
TOTAL	65	

It is apparent that word processing and keeping of students' records are the most important functions. Less than 20% acquired these computer systems for training their students or to use them as teaching aid/ resources (Table 2).

Table 2: For functions for which departments originally acquire the computer(s)

Purpose of computer acquisition	Frequency	Percentage
◆ Word processing	40	58.82
◆ Student records	38	55.88
◆ Designs and Drafting training	12	17.60
◆ Preparation of Multi-media teaching resource	11	16.18
◆ Database management	8	11.76
◆ Estimating	1	1.47

It is apparent that most of the respondents acquired knowledge of IT use through informal means and much of personal efforts of the educator was involved. Closely associated with the mode of acquisition of computer knowledge is the number of institution-initiated and/sponsored IT training opportunities (table

3). The survey further revealed that the educators have attended institution initiated and /sponsored training courses for an average of two times.

Table 3. How educators learn how to use Computer and other IT products

Mode of acquisition of computer Knowledge	Respondents	Percentage
I taught myself using books / computer-based software	31	46
I learnt it as part of course(s) while at school	11	16
Friends / relatives taught me	18	26
I attended a computer school/ training centre	16	24
My institution's organized training workshop	13	19
I have never learnt how to use computer	0	0
TOTAL	89*	

Multiple options were allowed

Proficiency level measurement is necessary in order to indicate how vast the educators are in specific IT software. Table 4 indicates that the respondents are more proficient in communication-based media than the more technical industry specific software. The AEC industry educators' highest level of proficiency is 3.51 for Internet (very proficient). They appear to be proficient in word processing packages, spreadsheet function and presentation packages. They appear to be moderately proficient in design packages

Table 4: Description of proficiency level in the use of computer packages/ services

Computer Packages	Index
Word Processing packages (e.g. MS Word)	2.99
Presentation Packages (e.g. MS PowerPoint, MS Publisher	2.03
Programming languages (Basic, Virtual Basic, Fortran, e_{t++}).	0.90
Database management packages	
MS Access	1.44
MS Excel, Lotus 1-2-3 or MS Lotus 1-2-3	2.72
Computer Based Communication media	
E-mail	3.38
Internet	3.51
Intranet	0.69
Design Packages (AutoCAD, ArchiCAD etc	1.75
Quantity Surveying software packages	0.49
GIS packages	0.96
Project Management software	1.04
Property and Facilities Management software	0.85

0 = cannot use at all, 1 = not proficient, 2 = moderately proficient, 3 = proficient, 4 = very proficient, 5 = very highly proficient

The respondent AEC industry educators has been deploying IT in the teaching and research process as indicated in Table 5. Apparently their IT deployment is more pronounced in communication than any other uses particularly knowledge impartation.

Table 5: Level of deployment of IT in teaching and research process

Teaching and research process	Index	Ranking
♦ Surfing the Net for research information	4.03	1
♦ Research data analysis	3.44	2
♦ Processing student results	3.34	3
♦ Communicating using E-mail	3.25	4
♦ Managing student records	2.99	5
♦ Direct Instruction to students	2.34	6
♦ Preparation of slides	1.71	7
♦ Communicating with students on-line	1.41	8

0 = not existent, 1 = very low, 2 = low, 3= moderate, 4 = high, 5 = very high

Table 6: Factors limiting the deployment of IT tools in the institutions

Factors limiting deployment of IT in Institutions	Index	Ranking
♦ High cost of hard and software	3.71	1
♦ Inadequate telecommunication network	3.28	2
♦ Computer illiteracy among staff	3.19	3.5
♦ Ineffective telecommunication network	3.19	3.5
♦ Attitudes of staff to IT deployment in construction education	3.09	5
♦ Inadequate related software	3.04	6
♦ Inertia of senior academics	2.85	7
♦ Lack of interest by the management of the institution	2.79	8
♦ Computer literacy level among students	2.76	9
♦ Personal contact is considered more effective	2.50	10
♦ Reliance on IT seen as disempowering	2.01	11

0 = not sure, 1 = strongly disagree, 2 = disagree, 3= weakly agree, 4 = agree 5 = strongly agree

Generally, institutional ownership of IT facilities is very poor. This may not be unconnected with poor institutional – led IT strategy. Most of the respondents acquired their computer systems personally. This impacted on the IT facilities they could install in their computer systems or they could have access to. Most of the computer enabled communication facilities were not present in sufficient quantities that will enable educators to be involved in full blown IT – enabled education of students. The policy of acquisition of computers seems not to envisage the institutional – acquired computers for education and training purposes. Very few of the respondents indicated that they acquired the IT system for specialized training in design, drafting and estimating.

The educators acquired their training in IT through informal means probably through continuous personal development. This is bound to affect the standardization of the knowledge acquired. The institutions have

provided little of such institution – facilitated training opportunities.. The low level of institution-initiated and /sponsored IT training opportunities seems to suggest that the capacity of AEC educators may be very low. Most institution – initiated IT training opportunities are for short durations and the knowledge contents are tilted towards IT appreciation. A higher frequency would have suggested exposure to higher capacity building beyond IT literacy to IT application to wider contexts.

The level of proficiency indicated for specific packages further confirms this low capacity. The industry specific IT packages recorded low proficiency measures. It is noteworthy however that there is a high proficiency values for communication media. Thus the capacity for Internet and intranet communication can be said to be present and can be tapped for further institutional use for advancement and global relevance.

4. Conclusion

The study has attempted an audit of the human resources available for the deployment of IT for the education of the AEC industry professionals. Majority of the educators did not receive formal ICT training, as institutional support appears to be weak. Their level of proficiency is higher for the less technical computer based communication media than for the industry-core-IT packages. There is need therefore for high-level institutional support and programme of training the educators (TTE) towards the capacity development of the AEC industry professionals.

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