Technology in Modern Day Life: Challenges to Polytechnic Education.

S.A. Olagoke, JP, MNSChE, MNIEM, MNIM, COREN[1] and D.W.S. Alausa, ACSN, MNIEM, MNSE[*2]

[1]Department of Mechanical Engineering, Federal Polytechnic, PMB 50, Ilaro, Ogun State, Nigeria
[2]Department of Computer Engineering, Federal Polytechnic, PMB 50, Ilaro, Ogun State, Nigeria.

[*]E-mail: Alausa2007@yahoo.com

ABSTRACT

Knowledge acquisition through various learning processes can only be made easier through full proof education with adequate instructional materials on ground. This should be pursued for school graduates to be millennium compliant in terms of contributions to modern day development ICT facilities. Improvement on technology education in our schools with the right facilities and current orientation is the only solution to realizable industrialization in the competitive market of business transactions. Technology determines the level of development, self-reliance and civilization of any nation today.
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INTRODUCTION

The world has actually gone through many social cycles caused by technological changes born out of human needs in our bid to satisfy the fundamental requirements of human life – shelter, food, and clothing and to create a more pleasurable environment of comfort for good health, affluence and long life. Each era of socio-technological change is subsequently marked out as a data base for improvement into subsequent ages as can be observed in the sequence below:

Stone Age ⟶ Iron Age ⟶ Renaissance or Middle age ⟶ Industrial Revolution and presently the information era of globalization.

One factor is in the increasing rapidness of these transitions and cost effectiveness of technological changes. For example, Olagoke (2000) observed data on a letter from London to Nigeria in the context of world communication.

MAILED	POST	TELEX	FAX M/C	E-MAIL
Minimum time	8 – 10 days	2 minutes	30 secs	¼ sec

Science leads to discovery, analysis of materials, and generation of concepts for predictable mapping from hypothesis, to laws, formulae and equations for idea standardization. Engineering relies on the data provided by science to design processing units and functional mechanical systems with precision prone method analysis.

Technology is therefore the applied principles of science and the creation of feasible products or structures through the process of identifying problems, development of methodologies, and the transformation of these into science-based mechanisms – manual or automated. Let us now peruse the demand for the present day development of the ever-changing technology.

TECHNOLOGY, THE SCHOOL, AND THE BUSINESS WORLD

In all facets of human endeavor, technology plays the most significant roles to address and achieve development of shelter, clothing, and food. Various disciplines – engineering, technology, mechanics, aeronautics, computers, electronics, chemistry, petroleum exploration, etc., have been interactively structured into sociology and the humanities for the transformation of all feasible knowledge. In this sense, the impacts of science and technology give rise to industrialization

through the emergence of industries like pharmaceuticals, medicine, household utilities, and functional infrastructure upon which sustainable developments depend, including power conversion, manufacturing, transportation, and communication.

The full-scale world of business is set through technological impact. Today, we have various design concepts, process, know-how, and fabrication concerns. Less manual and more automation based information technology demands increased levels of computer literacy. Computers in themselves are products of technology. It is appreciable that the present material world places a premium on quality and its control to counter quackery, counterfeiting, misuse, and mad-administration.

Within the context of the present world business practice and analysis, it is a matter of regret that facilities in most of our schools, including tertiary institutions, are grossly inadequate, most especially in the areas of modern equipment acquisition, facility procurement, and infrastructure levels required to meet the demands of modern day educational requirements and facilitate proper training of students. Even though designed curricula may tend towards the proper education and international standards, physical infrastructure is usually lacking. Agbaja (2005) observed that the computer revolution is continuously changing the way we learn, do business, and work. The emergence of the Internet brought into the world wider databases for students and researchers to acquire knowledge or engage a participatory learning. Equipping our schools with proper facilities and infrastructures to be relevant in product design and development for industries, must be a priority.

MILLENNIUM CHALLENGES FOR TECHNOLOGY

In all facets of society, technology know-how plays major roles for project realization. The trend, all over the world, is that technology changes at a rapid pace thus leading to many business dynamics or problems such as automation, redundancy, and loss of jobs, among others. However, for organizational effectiveness, strategies for coping with challenges must be developed. Workers must be computer literate to achieve desired results. Applications of Information Communication Technology (ICT) in the area of acquisition, processing, storage, retrieval, and dissemination of training information for decision-making must be understood and mastered.

For example, Internet facilities can be used to gain access to libraries, research institutions, and relevant documents to facilitate training and development. Internet facilities have provided access to research findings and contributing same worldwide-globalization through information technology.

- Today on education, cross fertilization of knowledge is made easier through:
  - Conference/training programs could be attended without leaving the office with the aid of computer assisted teleconferencing.
  - Presentation of lectures is facilitated using multi-media projector which is computer based.
  - The Internet, most especially E-mail, has provided a wider database for students and researchers to browse, down load and use.
  - E-learning (Electronic Learning) i.e., learning through personal computers (PC) with Internet services: The essential technology of E-learning is the personal computer, the Internet, and development in multi-media (streaming audio and video, 3-dimensional graphics screen images and voice technologies of tele-software, video-tex and video conferencing).
  - For Distance Education (DE) and E-learning where participants are separated by time and geography but technically interconnected to bridge the instructional group due to distance requires special technologies of tele-software, video-tex and video conferencing.
- At the business world level, communication at business corporate level transcends the general non-streamlined context of Informal Information System (IIS) where verbal directives dominate transactions. Technology plays prominent vital role in business transaction through Formal Information System (FIS) in which information provision is based on accepted and relatively fixed conception and definition of procedures for

collecting, storing, processing, disseminating and using relevant data/information in the following ways. Zakari (2005) highlights:

- Executive Support System (ESS)
- Decision Making Support System (DSSI)
- Management Information System (MIS) that provides summaries of activities and transaction useful for monitoring and controlling the levels of establishment operational activities.
- Office Automated System (OAS) in which data and operational analysis of flight scheduling production, inventory control, annual budgeting, contracts agreement and monitoring, resources allocation and relocation, capital investment and costs control, sales.
- Transaction Processing System (TPS): this involves marketing production, finance and personnel matters.

Technology has indeed overtaken manual applications with very high and appreciable mechanical advantages and reduced risks, accelerated rates of results, precision prone finishing touches to capacity, and capability buildings.

MATERIALS AND METHODS

Questionnaires were administered to collect information in five Polytechnics with regards to Section A and B below, while Section C was specifically administered to various Departments in the Federal Polytechnic, Ilaro. Section D was focused on facility adequacy in the five institutions:

A: Which of these facilities do you have in your Institution?
- Computer Assisted Teleconferencing
- Personnel/Lectures Personal Computer
- Telesoftware–VideoTex/Video Conferencing

B: Management Level: Which of these do you employ?
- Executive Support System (ESS)
- Decision Making Support System (DSS)
- Management Information System (MIS)
- Office Automated System (OAS)
- Transaction Processing System (TPS)

C: Number of available computers against the number of students, personnel (admin.), and lecturers for academics, to evaluate level of technological education impartation at cognitive and psychomotor level.

D: Are the training facilities adequate?

The data collected for Section C is as shown in the Tables below.

Against the backdrop of the Information Communication Technology factor for technological development and practice, Polytechnic education is being measured, using correlation co-efficient (cc) with respect to the number of available computers, computer literacy, and the number of personnel, academic staff inclusive, and the number of students for the program based on the data collected above.

RESULTS AND DISCUSSION

Results

The tables below showed the calculated values for correlation coefficient of various divisions of activity areas of the assessed Polytechnic that are expectedly ICT dependent.

Discussion

Virtually all the five Polytechnics visited are yet to go into full ICT for ESS, DSS, OAS, or TPS. They are without E-learning facilities except for the audiovisual components. The Central Administration is, however, on work processing through Management Information System (MIS).

For the link between ICT facilities and technological education, the correlation coefficient statistical measure shows they are dependent variables. The foundation of this is computer literacy, which is yet to be wholesomely accepted in Polytechnics.

Table 3 shows that there is a generally low correlation coefficient in the academics sector between the 81 lecturers that are computer literate and the 11,440 students, against the backdrop of 1:30 student-teacher ratio for ND and 1:0 ratios HND for effective teaching-learning cycle of impartation of knowledge.

Table 1: Raw Data Containing the Number of Computer Users and the Number of Available Computers.

(A)

DEPARTMENT	NO. OF STUDENTS	LECTURES			NON TEACHING STAFF		
		TOTAL NO.	COM. LIT.	NO. OF COMP.	TOTAL NO.	COMP. LIT	NO. OF COMP.
FOOD TECH	250	09	02	1	5	1	NONE
SLT	270	09	02	1	5	1	"
HCM	220	08	02	1	3	1	"
ESTATE	315	09	04	0	3	1	"
TRP	250	08	01	4	3	1	1
BLT	192	09	02	1	5	3	NONE
QS	200	07	01	0	5	1	"
CIVIL	420	09	02	1	5	2	"
MECH.	620	11	06	0	12	1	"
ELECT	806	08	06	1	8	5	"
COMPUTER	142	04	04	30	3	2	1
B.A.	1700	09	05	1	2	2	NONE
GNS	0	17	17	1	2	2	"
MKT	2000	08	08	1	2	0	
ACCT	2684	13	06	1	3	1	"
B & F	700	07	04	1	2	1	2
MATH/STAT	51	09	06	1	2	2	NONE
SEC. STUDIES	620	08	03	43	2	1	"
TOTAL	11,440	162	81	89	74	28	

Table 1 (continued): Raw Data Containing the Number of Computer Users and the Number of Available Computers.

(B)

	SENIOR STAFF			JUNIOR STAFF		
	TOTAL NO.	COMP LIT.	NO. OF COMP	TOTAL NO.	COMP LIT	NO. OF COMP.
RECTORY	5	3	5	10	0	NONE
REGISTRY	53	8	12	20	1	-
BURSARY	28	8	10	13	12	-
LIBRARY	7	7	11	43	15	-
PHYSICAL PLANNING	3	1	3	0	0	-
WORKS	8	2	1	42	1	-
MIS (R&D)	13	12	8	7	3	-
TOTAL	117	41	50	135	30	

Table 2: Number of Lecturers (B) Against Available Computers (D) (Sample Calculation).

S/N	DEPT.	B	B – B	$(B - B)^2$	D	D – D	$(D - D)^2$	(B-B) (D-D)
1.	FOOD TECH	9	0	0	1	-3.944	15.555	0
2.	SLT	9	0	0	1	-3.944	15.555	0
3.	HCM	8	-1	1	1	-3.944	15.555	+3.944
4.	ESTATE	9	0	0	0	-4.944	24.443	0
5.	TRP	8	-1	1	4	-0.944	0.891	+0.944
6.	BLT	9	0	0	1	-3.944	15.55	0
7.	QS	7	-2	4	0	-4.944	24.443	9.888
8.	CIVIL	9	0	0	1	-3.944	15.555	0
9.	MECH	11	2	4	0	-4.944	24.443	-9.888
10	ELECT	8	-1	1	1	-3.944	15.555	+3.944
11.	COMPT	4	-5	25	30	25.050	627.803	-125..28
12.	B.A	9	0	0	1	-3.944	15. 555	0
13.	GNS	17	8	64	1	-3.944	15. 555	-31.552
14.	MKT	8	-1	1	1	-3.944	15. 555	+3.944
15.	ACCT	13	4	16	1	-3.944	15. 555	-15.776
16.	B & F	7	-2	4	1	-3.944	15. 555	+7.888
17.	MATH/STAT	9	0	0	1	-3.944	15. 555	0
18.	SEC STUDIES	8	-1	1	43	38.562	1448. 259	-38.056
	TOTAL	162		122	89		2336. 942	-190

(**Sample Calculation)**

B = 9.00, D = 4.944, CC = -0.36

$$\text{CORRELATION COEFFICIENT} = \frac{\sum(B - B)(D - D)}{\sum(B - B)^2 \sum(D - D)^2}$$

where B and D are mean values.

$$= \frac{-190}{(122)(2336.942)}$$

$$= \frac{-190}{533.954}$$

$$CC = -0.36$$

Table 3: Summary of Results.

S/N	NO. AND TYPE OF USERS	ICT 9NO. OF COMPUTERS	CC	ICT (IMPACT)
1.	Lecturers (162)	Computer (Academics) (89)	-0.36	Number of computers is low compared to number of lecturers for ICT effect to be felt and reflect in handling tech impartation. Effect opposes the target
2.	Students (11,440)	Computer (Academics) (89)	-0.11	* Inverse situation with low correlation efficient * Quality of tech appreciation is low. Effect opposes the target.
3.	Personnel (252)	Computer (Admin) (50)	0.534	Speed of work processing is only with average this coefficient of correlation.
4.	Computer literate Personnel (71)	Computers (Admin) (50)	0.77	* Work processing area of activities * High level of productivity with good work method result * The Polytechnic depends on this area for work processing.
5.	Computer literate lecturers in Engineering ((18)	Number of Students (1,988)	-0.2	* Strong link is established for quality technological impartation.
6.	Students in Engineering (1,988)	Computer (Engineering) (32)	+0.80	* Number of computers too few for this high number of students. Adverse implication may result.
7.	Computer literate Personnel in Engineering (10)	Computer Departmental Offices (3)	+0.58	* Speed of work method is above average * It is Manageably okay but may not cope with large volume of work
8.	Personnel in Engineering (28)	Computer Departmental offices (3)	-0.66	* Speed of work is very low * Cannot cope with large volume of work

In the administrative sector the 0.8 correlation coefficient is high and this is evident in the fact that the Registry is the activity center for result and executive decision processing coping with large volume of work.

The ratio of computer literate teachers to all lecturers is 1:2. This is not adequate for any School of Technology and the 71:252 or 1:4 computer literate personnel to all personnel ratio is also poor for effective work coordinating and processing.

FINDINGS

- There is a strong link between ICT facilities literacy for the quality of technological education being imparted.
- Computer literacy enhances development of cognitive and psychomotor domain for enhanced technological knowledge impartations.
- Computer literacy is generally inadequacy in most of our institutions of higher learning with direct consequences to low participation in school-industry partnerships on product design development and levels of commitment to research.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Technology is a key factor which determines the level of development, self-reliance, and civilization of any nation. This can only be achieved at sustainable levels through good and sound technological education for which the Polytechnic is designed. However, in Nigeria, the fact that these schools are yet to become ICT facility fully compliant in terms of capacity and infrastructure, Polytechnic management needs to update curricula and facilities to be millennium compliant and stay abreast of modern trends in academics and business development.

Recommendations

The following steps are fundamental to sound Polytechnic education:

- Adequate funding of technical education.
- Provision of adequate facilities for technical education.
- Provision of health insurance and soft loans to staff funding of research projects and staff development.
- Implementing the NBTE Kaduna Summit of May 30th 2006, of the Honorable Minister of Education, Executive Secretary NBTE and all Rectors/Provosts of Polytechnic and Monotechnics with respect to the following:
  - Computerization of all operations of all tertiary institution with a view to capturing biometric data of students and staff in various institutions as well as being online.
  - Establishment of ICT infrastructures in all Polytechnic/Monotechnics to enhance instructional delivery, registration exercise, payment of fees, library operation, staff and students management, etc.
  - All academics staff must be computer literate. Institutions should assist each lecturer to have a laptop to be paid for over a period of time.
  - Carriage capacity as determined by NBTE program with reference to 70:30 ratio (science, engineering, environmental, management studies) must be strictly adhered to.
  - Admission of students must be focused on having the best candidates through verification of WAEC/NECO results as well as screening JAMB scores.
  - Verification of academic qualifications of teaching staff with a view to curbing cases of certificate forgery and unqualified staff teaching in these institutions.
  - Updating academic curricula to meet current development in engineering or technological education as demanded of Polytechnics.

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