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UTILIZATION OF COMPUTER TECHNOLOGY IN PUBLIC UNIVERSITIES IN GHANA: IMPLICATIONS FOR MANAGEMENT

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This study investigated computer technology for instructional and administrative use in public universities in Ghana. Self-administered questionnaires were distributed to 450 academic staff and 98 administrators in three Ghanaian public universities: the University of Cape Coast (UCC), the University of Ghana (UG), and Kwame Nkrumah University of Science and Technology (KNUST).

Computers were generally available for both lecturers and administrators to use. Availability and access to technology did not differ significantly between universities. Academic staff used computers mainly for preparing lecture notes or reports while administrators used them mainly for preparing memos and reports. Fifty-five percent of lecturers and 58% of administrators reported low or moderate skills in the use of computers. A majority of the respondents obtained their skills through self tuition rather than formal tuition.

The findings suggest that universities could improve the availability, access and skills in the use of relevant technologies as part of their staff development programmes. Progress could be monitored by current accreditation programmes.

Introduction

Computer technology refers primarily to the use of computers to access information, communicate, support instruction and assist in the accomplishment of administrative and managerial tasks in educational institutions. The effective use of computer technology depends upon its availability and the skills of users. Computer technology is paramount in improving teaching and learning in educational institutions.

The trend of technology use in education has not been the same everywhere. Some countries have moved faster than others and even within countries, districts have moved at different rates. Although some educators assume educational technology is a recent development, it is clear that whatever form or direction educational technology may take, it has a long continuous history that began in ancient times (Saettler, 1990). Rapid changes and improvements in computer technology are occurring everyday and they are becoming beneficial to almost every sector of the society.

Educational institutions are bound to join this technological revolution, in order to keep up with the pace of the computer age and, benefit from it.

The introduction of new technologies and their use in educational settings bring about changes in the way things are done within educational institutions. According to Charp (1998), the Internet and interactive computer-based multimedia capabilities are transforming educational institutions and the way teachers teach and students learn. She observed that, although training of new teachers to use technology is still not widespread, a large number of educators do use technology and technology is motivating as teachers become more comfortable with its use.

Studies have further shown that technology can improve and make teaching and learning more effective. For instance, one study conducted showed that the use of technology at the University of Illinois improved communications with students, provided active learning, and enabled students to become involved in learning how to use new tools (Sumner & Hostetler, 1999). Technology in education provides an array of tools for acquiring information and increasing access to successful learning (Dwyer 1994). The appropriate use of computer technology can improve teachers' skills and knowledge, enhance the achievement of all students and improve school administration and management. Kulik and Kulik (1991), for instance, found that software incorporating self-paced instruction improved the speed of learning and student achievement consistently by 20%.

There are many factors that can deter or enhance the use of computer technology in schools. The factors may be economic, cultural, physical or personal. Technology can be expensive and an institution may not be economically capable of acquiring technology devices and facilities. Factors that influence technology use especially in higher educational institutions include the incompatibility of technology and organizations' capability and skills, available support for technology use and environmental factors (Sumner & Hostetler, 1999). In order for technology to be utilized effectively, a technological infrastructure must exist, and the specific technology being introduced needs to be compatible with experiences and values of potential users. These issues are

important to consider if technology can be used more effectively.

In Ghana, government support to the public universities as well as other tertiary institutions continues to decline in the face of the continuing increase in operating cost per student and the sharp increase in the demand for tertiary education. Higher education in Africa is facing a critical challenge to meet new demands for the 21st century with its ever-increasing population growth (Darkwa & Mazibuko, 2000). As more people seek access to higher education, academic courses are being diversified to meet increased enrolments and to satisfy manpower needs. In the process, educational institutions have become larger and more complex, but at the same time resources to provide infrastructure have become more difficult to obtain. Since computer technology is an important resource in any growing educational institution, it is important that it is used effectively to aid in achieving educational goals.

Overall, with computer technology, tasks could be accomplished more effectively and efficiently and should therefore be integrated in any education plan (Picciano 2002). However, there are challenges in its use including acquiring and maintaining equipment usually at great cost; providing appropriate infrastructure; and training staff to use the technologies as they are introduced into the educational system.

Statement of the Problem

In spite of its educational importance, the availability and extent of use of computer technology in Ghanaian public universities have not been fully described. Neither have the frequency and purpose of computer technology use by lecturers and administrators been documented. This study was therefore undertaken to assess the extent to which computers are used in Ghanaian tertiary institutions particularly public universities. The study also compared the differences in computer technology use among the various public universities.

Two key questions that were raised to provide focus for the study were:

1. What are there are computer echnologies being used in the three Ghanaian universities studied in terms of instruction by lecturers?

2. What are the computer technologies being used in the three Ghanaian universities studied in terms of task performance by administrators?

Methodology

There are a total of five public universities comprising the University of Ghana (UG), Kwame Nkrumah University of Science and Technology (KNUST), University of Cape Coast (UCC), University of Education Winneba (UEW), and the University of Development Studies (UDS). The target population of the study included all the lecturers and senior administrators of the five public universities. However, the study participants were purposively selected from the three oldest public universities, namely UCC, UG, and KNUST. These three universities were selected because they are regarded as pacesetters, well established and leaders in tertiary education in Ghana. It was premised that they represent a typical profile of Ghanaian public universities and a generalization could be made from the findings.

In each of the three universities, two groups of professionals constituting the senior members of the universities, namely, lecturers and administrators, were selected for the study. The sampling frame for the lecturers and senior administrators was derived from the latest available staff lists from each university. There were 474 lecturers and 41 administrators from UG, 394 lecturers and 29 administrators from KNUST, and 285 lecturers and 28 administrators from UCC. This gave a total sampling frame of 1153 lecturers and 98 senior administrators. The majority of lecturers and administrators were males in all the universities. In KNUST, UG and UCC, 93%, 62% and 87% respectively were male lecturers. In the case of the male administrators they formed 84% in KNUST, 71% in UG and 93% in UCC.

The lecturers were selected by stratified random sampling. The various faculties to which they belong formed the strata; 40% of lecturers were selected from each stratum to give a sample size of 450. All 98 senior administrators of the rank of Assistant Registrar or higher were purposively selected, as they did not constitute a large population.

The variables investigated included availability and access to computer technology resources, what the computers were used for and the frequency of computer use. The

types of training staff have received in computer use, skills they have in its use, and the determinants of computer technology use were also examined. Regarding the computer skills, respondents were asked to self-rate their proficiency as one of three options – highly proficient, moderate (some working skills) and low (basic knowledge).

The relationship between selected explanatory characteristics (relating to the sex, status, teaching experience and specialty of the faculty member as well as easy access to a computer) and frequency of computer use (weekly or daily) was examined using a logistic regression model. Respondents were also asked about their general perception of the value of computer technology.

Of the 188 people who participated in the study, 80(43%) were lecturers from KNUST, 55(29%) from UCC and 53(28%) from UG. Overall, 99 (53%) lecturers worked in the broad field of Sciences, 64 (34%) in the Humanities, and 25 (13%) in Education (see Table 1). There were 61 administrators, including 19 from KNUST, 14 from UCC and 28 from UG. The majority (72%) of the senior administrators worked in the general administrative sector of the universities and the remainder worked in the administrative section of the schools, colleges, and faculties (see Table 2).

Table 1
Characteristics of Lecturers within the Three Universities

Characteristics	UCC N=55	UG N =53	KNUST N=80	Total N =188	UCC %	UG %	KNUST %	Total %
Field of study								
Sciences	14	23	62	99	25.5	43.4	77.5	52.7
Humanities	16	30	8	64	29.1	56.6	22.5	34.0
Education	25	0	0	25	45.5	0.0	0.0	13.3
Rank								
Professor	0	1	3	4	0.0	1.9	3.8	2.1
Associate Prof	4	4	6	14	7.3	7.5	7.5	7.4
Senior Lecturer	12	20	27	59	21.8	37.7	33.8	31.4
Lecturer	32	22	42	96	58.2	41.5	52.5	51.1
Assistant Lecturer	7	6	2	15	12.7	11.3	2.5	8.0

Table 2
Characteristics of Administrators within the Three Universities

Characteristics	UCC N=55	UG N =53	KNUST N=80	Total N =188	UCC %	UG %	KNUST %	Total %
Work sector								
Central Administration	11	20	13	44	78.5	71.4	68.4	72.1
Within faculties, schools, colleges	3	8	6	17	21.4	28.5	31.5	27.9
Rank								
Assistant Registrar	8	22	12	42	57.1	78.6	63.2	68.9
Senior Assistant Registrar	2	6	5	13	14.3	21.4	26.3	21.3
Deputy Registrar	3	0	2	5	21.4	0.0	10.5	8.2
Registrar	1	0	0	1	7.1	0.0	0.0	1.6

Computer Technologies used by Lecturers

Computers and printers were found to be widely available to 96% of lecturers either within their own departments or elsewhere in their respective universities (UCC 98%, UG 93% and KNUST 98%). Some computer technology related facilities such as Internet, and email, were frequently shared between departments rather than owned by individual departments. Generally, 93% of lecturers to whom computers were available reported easy access to them. Lecturers from KNUST had the greatest access (98%) while those from UCC had the least access (85%).

With regard to the procedures followed to obtain access to the available computer technology devices, lecturers indicated that computers, printers, Internet, and email facilities were most frequently available on their desktops or located in departmental offices. A higher proportion of lecturers in KNUST (56%) and UG (58%) reported access to computers from their desktops, than those in UCC (28%).

In contrast, lecturers had to apply in writing to access LCD projectors for use. Although available computers were fairly accessible, 78% of lecturers in UCC, 89% in UG and 91% in KNUST reported that the computers were inadequate in number. Other reported limitations to computer technology use were unreliable electricity, inadequate technician support and large class sizes.

Generally, lecturers used computers, printers, Internet and email facilities daily or weekly. Seventy eight percent of lecturers used computers daily, while 77% used LCD projectors only occasionally. The chi square test was used to compare the frequency of computer use among the three universities. The frequency of use of computers differed significantly between the universities $\div^2$ (8, N = 176) = 50.07, $p< 0.01$. Those who had easy access to available computers and their peripherals used them more frequently, that is, on a daily basis rather than occasionally. Sixty-eight (88%) lecturers at KNUST used the computers daily compared with 29 (57%) lecturers in UCC. Computers were most frequently used for preparing lecture notes, reports or memos (85%) and electronic mail (61%), (see Table 4). Although lecturers valued computers and enjoyed using them for their teaching and research activities, less than 42% of them used computers for teaching or making presentations at workshops. Lecturers at UG appeared to be most likely to use computers for teaching related functions. Microsoft Word was the most common computer applications used (98%)while AutoCAD was the least common (14%). Other applications used by lecturers were Excel (84%), Microsoft Power Point (76%), SPSS (47%), and Microsoft Access (27%).

From the logistic regression model, factors independently associated with frequent use of computers were easy access to computers, rank of lecturer, current university of lecturer, being a male staff and longer teaching experience (see Table 3). Two of these were significantly associated with the frequent use of computers. Compared with Assistant lecturers, lecturers were nearly nine times as likely to use computers frequently, after taking account of their sex, specialty, teaching experience. Lecturers at KNUST were nearly ten times as likely to use computers frequently as those at UCC. The probability of using computers frequently increased with increasing years of teaching experiences; however these differences were not statistically significant (see Table 3).

Lecturers who used computers had acquired their skills through self-tuition (63%), workshops (21%) or formal computer courses (32%). Lecturers in UG were most likely to self-report high proficiency in computer use (50%) as against 30% in the other two universities.

Table 3
Logistic Regression Analysis Explaining the Frequent Use of Computers

Term (factors that might affect use)	Odds Ratio	95% C.I.		Coefficient	S.E.	Z-Statistic	P-Value
Rank (2/1)	8.6	1.7	44.0	2.1	0.8	2.6	0.01
Rank (3/1)	0.9	0.1	5.1	-0.1	0.9	-0.2	0.88
Rank (4/1)	1.2	0.1	12.0	0.2	1.2	0.2	0.87
Curruniv (2/1)	2.6	0.6	11.4	1.0	0.7	1.3	0.19
Curruniv (3/1)	9.5	1.4	65.8	2.3	1.0	2.3	0.02
Sex (Yes/No)	2.9	0.9	9.8	1.1	0.6	1.7	0.08
FacGroup (2/1)	1.4	0.4	5.4	0.3	0.7	0.5	0.61
FacGroup (3/1)	1.0	0.2	5.6	0.0	0.9	0.0	0.98
Accesspc (Yes/No)	4.1	0.9	19.2	1.4	0.8	1.8	0.07
Teachexp (2/1)	1.4	0.3	5.6	0.3	0.7	0.5	0.65
Teachexp (3/1)	2.5	0.3	21.1	0.9	1.1	0.8	0.41
Teachexp (4/1)	4.1	0.6	29.0	1.4	1.0	1.4	0.16
Constant	*	*	*	-2.4	1.4	-1.8	0.08

Note. rank = status of faculty member (1=Asst Lecturer, 2=Lecturer, 3=Snr Lecturer, 4=Assoc or Full Professor); Curruniv = Current University (1=UCC, 2=UG, 3=KNUST); Sex (referent group = female); FacGroup = broad specialty (1=Sciences, 2=Humanities, 3=Education); Accesspc = self reported ease of accessing a computer (referent group = difficult access); teachexp = years of teaching experience (1=Under 4 years, 2=4 to <10 years, 3=10-16 years, 4=More than 16 years)

Table 4
Areas of Computer Use by Academic Staff in the Three Universities

Use of Computers	UCC	UG	KNUST	Total	UCC %	UG %	KNUST %	Total %
Teaching	13	26	34	73	25.5	54.2	44.2	41.5
Presentation at Workshops	12	21	22	55	23.5	43.8	28.6	31.3
Preparing memos, notes and reports	41	44	64	149	80.4	91.7	83.1	84.7
Managing records	22	27	43	92	43.1	56.3	55.8	52.3
Communication (Email)	26	30	48	104	54.2	65.2	62.3	60.8
Obtain information (Internet)	16	14	30	60	34.0	30.4	39.5	35.5
Other	5	2	1	8	9.8	4.2	1.3	4.5

Computer Technologies Used by Administrators

Computers and printers were widely available to administrators. The differences in the departmental availability of email, and the Internet facilities between the universities were statistically significant ($P< 0.01$). Among administrators, who indicated that computer technologies were available, most of them reported easy access to computers 52 (85%), printers 51(83%) and LCD projectors 56(92%) for their work. As with the lecturers, administrators reported that computers and printers were most frequently available on their desktops while LCD projectors were available at resource centres. However, unlike the lecturers, the administrators had fewer problems obtaining the LCD projectors. A lower percentage of administrators reported inadequacy of computers (68.4%) from the three universities.Nearly 97% of administrators used computers daily, while 81.5% used LCD projectors only occasionally. Computers and printers were used most frequently by administrators for preparing memos and reports and to a lesser extent managing records. Computers were used for preparing memos and reports by 13 administrators in UCC (93%), 22 in UG (92%), and 16 in KNUST (89%) (See Table 5). The Internet, email and fax were used mainly for correspondence or communication purposes by a high proportion of the respondents. As with lecturers, university administrators were most likely to use computers and printers daily. However, a lower proportion of administrators (46%) used the Internet and email on a daily basis when compared to lecturers (60%).

More than half of the administrators ie. 33(58%), indicated that they had moderate working knowledge of computer technology. Their computer skills were obtained through workshops, formal courses, self-tuition, and other informal training such as learning from colleages, and learning on-the-job. More than half of the administrators reported self-tuition in the use of the Internet and email. On the whole, 55% had moderate skills in the use of computers, 45% in the use of the Internet and email. Of those who used computers, 52 (98%) used MS Word. The least commonly used applications were Access and AutoCAD. Although 45 out of the 53 administrators used Excel, they used it occasionally. It was expected that as administrators,

Access and Excel would be applications more commonly used by them for administrative activities such as data storage and management, and budgeting.

They commented that: "computers have come to revolutionize administration...one cannot begin to underestimate the strides that have been made in the various fields of human endeavour; thanks to the introduction of the computer"; "computer use has brought a breakthrough in information management, storage, and retrieval and it is indispensable to any modern office". Training was also generally considered an important issue; this is summed up in comments such as "There is an urgent need to train staff." The limitations to computer use were attributed to lack of software, skills, inadequate infrastructure, availability and accessibility.

Table 5
Areas of Computer Use by Administrators in the Three Universities

Use of Computers	UCC N=55	UG N =53	KNUST N=80	Total N =188	UCC %	UG %	KNUST %	Total %
Teaching	0	1	0	1	0.0	4.2	0.0	1.8
Presentation at Workshops	1	4	1	6	7.1	16.7	5.6	10.5
Preparing memos, notes and reports	13	19	16	519	92.9	91.7	88.9	89.5
Managing records	8	17	8	33	57.1	70.8	44.4	57.9
Communication (Email)	11	16	13	40	78.5	76.1	72.2	75.4
Obtain information (Internet)	8	14	12	34	57.7	66.6	66.6	64.1
Communication (Fax)	5	14	8	27	35.7	66.6	44.4	50.9

There was no statistically significant difference in the skills of the respondents in the use of computers in the three universities. Comparatively, it appeared that administrators had rated themselves lower than lecturers in the skills they had in the use of computers (17% and 36% respectively).

Respondents were generally favourably disposed towards the use of computers. A majority of them viewed computers as time and energy savers.

Discussion

This study seems to be the first to comprehensively assess the factors associated with the use of computers by lecturers and administrators in Ghanaian public universities. The study focused on the availability and access to computers, frequency of use, the kind of computer applications used and what computers are used for. Self reported proficiency skills and training acquired were also considered.

Available computers that were easy to access and did not need cumbersome administrative procedures such as filling forms or writing letters were most frequently used in most cases. It therefore appears that where computers were most widely available and access to them was easiest, were also where they were most frequently used.

The pattern of use in terms of frequency and type of applications used differed with university and kind of application mainly because of the difference in professional needs. KNUST for example had prevalent use of AutoCAD probably because of the engineering and architectural courses it runs. The administrators used data management applications to manage their records while the academic staff used word processing applications to prepare for lectures or report writing. Although computers were used on a daily basis by lecturers, they were used more frequently for writing reports rather than for teaching and presentations. Less than half the lecturers used computers for teaching.

The difference in frequency of use may be related to access. The computer application found to be more widely used was word processing, while to a less extent data management and spreadsheet applications were used.

Management could help improve or increase the use in data management applications to improve the management of data used in the universities.

Respondents agreed that being able to improve the computer-based information system of the universities will make the collection of data less expensive, more accurate and consistent.

Both lecturers and administrators regarded computers as essential tools. However only about half the respondents were highly proficient in the general use of computers, with a majority of them obtaining their skills from self tuition. Generally the respondents had a favourable attitude towards the use of computer technology, some of whom further commented that "Every lecturer should learn to use computers." Central and local management of universities can build on this attitude to provide in-service training in the use of computers so that a larger proportion of staff obtain skills in computer technology use. Limitations to computer technology use that need to be noted and addressed by management are the inadequate technical support staff, alternatives to unreliable power supply, and access to relevant software. This would eventually increase the use of computer technology among staff in the public universities as they keep up with the advances in computer technology.

A number of limitations have to be noted. Although the response rate for this study was low (42%),the response rates from comparable studies on computer technology use were similar or lower. Shih-Chung (1998) for instance, had a response rate of 39% in a study to assess the level of faculty use of media and computers in Tamkang University in Taiwan. Another limitation is that since the available computers were not physically validated, this may have led to exaggerations or biases. To reduce this bias the questionnaires were made anonymous.

Conclusion

Overall the use of computers was high among lecturers and administrators in all the three universities. Computers that were available within departments, and had the least cumbersome procedures to access were most frequently used. There is therefore the need to improve access of computers to users, as well as remove existing barriers to access.

Most respondents obtained their computer skills from self-tuition. This implies that management needs to increase the frequency and diversity of the present staff development training programmes. Also the particular skills and relevant software needed have to be assessed. Progress could also be monitored by current accreditation programmes. Generally, the respondents had a positive attitude towards the use of computers.

Management of the universities need to take advantage and build on the favourable perceptions to improve on the effective use of computers, which in turn would improve productivity of staff.

References

Charp, S. (1998). Preparing the 21st century teacher: educational technology and teacher education (Technology Information). *THE (Technological Horizons In Education) Journal, 26*, 6.

Darkwa, O. & Mazibuko, F. (2000). *Creating virtual learning communities in Africa: Challenges and prospects*. Retrieved Jan 22, 2003, from the World Wide Web: http://firstmonday.org/issues/issue5/darkwa

Dugger, W. E. J. (2001). Standards for technological literacy. *Phi Delta Kappan, 82*, 513.

Dwyer, D. (1994). Apple classrooms of tomorrow: What we have learned. *Educational Leadership, 51*, 14-15.

Green, S. B. Salkind, N. J.& Akey, T. M. (2000). *Using SPSS for Windows: analyzing and understanding data*. Upper Saddle River, New Jersey: Prentice Hall Inc.

Kulik, C. C. & Kulik, J.(1991). Effectiveness of Computer-based Instruction: An updated analysis. *Computers in Human Behavior, 7*(12), 75-94.

Picciano, A. G. (2002). *Educational leadership and planning for technology*. (3rd. ed.). New Jersey: Pearson Education, Inc.

Saettler, P.(1990). *The Evolution of American Educational Technology*. (Revised edition ed.). Englewood, Colorado: Libraries Unlimited Inc.

Shih-Chung, L. (1998). A study of the design and functionality of multi media classroom. *International Journal of Instructional Media*, 25, 301-312.

Sumner, M. & Hostetler, D. (1999). Factors influencing the adoption of technology in teaching. *The Journal of Computer Information Systems, 40*(1), 81-87.

Underhill, R. G. (1994). Technology: Are we really communicating? *School Science and Mathematics, 94*, 393.