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ICT COMPETENCIES AMONG STUDENTS ENROLLED IN MASTERS IN FACILITIES MANAGEMENT

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Abstract

Facilities Management (FM) is a discipline having close ties with the efficient management of an organisations built environment. In today's ever competitive business environments, a core mandate for FM employees is to acquire Information and Communications Technology (ICT) skills which enables, supports and acts as a utility for innovation towards optimally and efficiently managing the built environment. The rate of continuous developments in ICT however equally calls for a continuous review in ICT skills in FM. Literature sadly shows that few reviews on ICT skills are conducted, especially in developing countries. As such, this research studied ICT competencies among 49 students enrolled in Masters in Facilities Management (MFM) in 2013/2014 Academic Session in Ahmadu Bello University (ABU) Nigeria with a view to assessing the application of ICT in the student's places of work. A survey was conducted on the MFM students to collect data using a structured questionnaire. Results reveal that while all students studied use an ICT devise in their place of work, Relative Importance Index however revealed that word processing, spread sheet and downloading (specifically for research) using online databases are the three most used ICT applications. Owning to the shortage of skills in the more technical ICT applications studied which are fundamentally required in current FM practice, the researchers recommended that the MFM curriculum should give more priority in teaching the ICT applications in deficit so that the students can meet up with the marketability requirements for FM practice upon graduation.

Keywords: ICT competencies, Masters in facilities management, students

1.0 INTRODUCTION

As asserted by [1], the seminal application of computer graphics and virtual and augmented reality by Ivan Sutherland in the 1960's pioneered the deployment of Information and Communications Technology (ICT). In universities, there has been an increase in the presence and usage of information processing devices in the later part of the 20th century [2; 3]. This has resulted to immense benefits. For instance [4] asserted that the use of ICT has shown an increase in the motivation of student's willingness to learn. In a similar vein, the use of ICT in a university seems to be beneficial in keeping students' attention [5]. These benefits among others continue to attract academic interest which is evident from the body of literature on how ICT can play a role in enhancing university education.

A unique characteristic of the construction industry is its being archaic and slow in terms of ICT application when compared to other industries like manufacturing and aviation among others. According to [6], despite the slow ICT uptake in the construction industry which can be linked to various barriers within and beyond it, certain realisations have emerged with several prospects and potentials. A leading prospect is as highlighted by [1] where they posit that there is a high level of awareness on ICT's contribution towards improved productivity in the construction industry. One of the forums that have an effect on such ICT awareness are institutions training the professionals pulled by the construction industry. This is in line with the statement by [7] that construction education can be leapfrogged to produce internationally qualified and globally competitive graduates grounded in ICT for the construction industry. Facilities Management (FM) being a discipline having close ties with the construction industry is no exception to these assertions.

Due to the ICT competency demand in managing the works of the built environment in recent times (which is the core domain of FM), this has posed great challenges to the academia in its quest to filling the gap between ICT modules taught in institutions against fulfilling ICT skills required in efficiently managing the built environment required for practice. This is in line with

the assertion of [8] that the rate of continuous developments in ICT equally calls for a continuous review in ICT skills. Hence, there is a need to improve students' ICT skills, since it has become a centre point of the twenty-first century. Literature however shows that few reviews on ICT skills are conducted especially in developing countries [8]. As such, Ahmadu Bello University (ABU) Nigeria amongst all other tertiary education institutions have a responsibility to contribute to improving students' ICT skills that reflect the needs of the job market. This is of utmost importance because the students trained by these institutions ultimately become the employees of organisations that require their ICT skills to meet up with the ever competitive business environment of the twenty-first century.

This study intends to investigate ICT competencies among newly enrolled MFM students in 2013/2014 Academic Session in ABU Nigeria with a view to assessing the application of ICT in their places of work. The rationale for the research stems from the quest to understanding ICT strengths and weaknesses among the students studied so that a prompt action may be taken to improving the curriculum from the effects noted in the results of this study.

2.0 LITERATURE REVIEW

There exist a lot of work both in the fields of FM and ICT. This section while trying to review literature on how the two fields relate will also present MFM in ABU Nigeria.

2.1 Facilities Management And ICT Competencies

The British Institute of Facility Management (BIFM) defines FM as the integration of multi-disciplinary activities within the built environment and the management of their impact on people, the workplace and technology [9]. The terms 'people', 'workplace' and 'technology' from this definition has close links with ICT. The American Libraries Association (ALA), defines Information and Communication Technology (ICT) as skills that enable an individual to use computers, software applications, databases and other technologies to achieve a wide variety of academic, work-related, and personal goals [8; 10]. Comparing these definitions of FM and ICT, people are meant to acquire technological skills which when applied to an organisation will lead to efficient management of the organisations workplace.

There exist a lot of literature that have showcased how ICT is applied to different domains or disciplines. With particular emphasis on FM discipline, [11] is of the opinion that ICT competency plays three major roles which are:

(i) ICT as an enabler;
(ii) ICT as a support infrastructure; and
(iii) ICT as a utility for innovation.

As an enabler, most tasks in FM organisations are becoming technology-based and as such, acquiring ICT competency enables the efficient execution of the task. Similarly, ICT as a support infrastructure makes possible the use of the technology to collect new ideas about particular tasks of a FM organization. Furthermore, ICT serves as a utility for innovation in FM organisations whereby the use of ICT optimises operations in the entire work processes. As such, the role of ICT towards the success of FM organisations cannot be overemphasised. This is evident from works of [12] which concluded that ICT in FM is perceived to be a driver of success in today's ever competitive business environments by its role as an efficient tool that can efficiently optimise FM delivery.

According to [8], the minimum ICT competencies required of a student is that needed to: access; evaluate; communicate information; and to produce documents electronically. Depending on ICT application however, these ICT competencies must be tailored to packages and tools that are specific to disciplines. It must be stressed here that competency in ICT includes both competency in the use of the hardware or device and also the competency in the use of the software which is also referred to as program/package/tool. As such, ICT competency to be acquired by Facility Managers must integrate these two.

2.2 Masters in Facilities Management in Ahmadu Bello University Nigeria

Buildings and their associated assets in the built environment represent substantial investments to their owners. Due to the dynamic nature of the built environment in recent time, multi-faceted skills are required to achieve efficiency in managing its buildings and associated ensembles [13]. In recognition to current trends in efficiently managing the built environment and the increasing demand for professionals to devise professional skills that will give them competitive advantage in such, the Department of Building, ABU Nigeria pioneered the introduction of a Master's degree in Facilities Management (MFM) in 2006 [9]. The need for this program became obvious due to new concepts and practices in the management of built spaces and the installed facilities therein. According to [13] and [9], the objectives of the MFM programme are to:

(i) Understand the science/technology of buildings and the various installations they contain;
(ii) Understand a facilities users' behaviour;
(iii) Understand health problems that may arise during the usage of the facility;
(iv) Understand how to gather, analyse and manage information on defects arising from the facilities managed;
(v) Proffer informed solutions to the defects of the facilities;
(vi) Provide sound financial advice on how the defects of the facilities are to be remedied;

(vii) Supervise the maintenance of the affected facilities using the right technology so that it functions optimally;
(viii) Be familiar with relevant issues on laws and ethics in connection with buildings and facilities.

The MFM programme has a minimum duration of two academic sessions [13]. The students are taught on a part-time basis during the weekend. The first two semesters are involved with course work. The last two semesters are used by the student to prepare a project on any aspect of the taught courses as may be approved by the Department. In the work of [9], they showcased that the MFM courses taught in the MFM program of ABU Nigeria indeed have Information, Communication and Technological contents in their curricula. Due to the ever increasing advances in ICT however, the need for an equivalent improvement in these courses of the MFM program cannot be overemphasised. This is in line with assertion by [13] that, the MFM program provides a professional qualification to would-be Facilities Managers who want to enter a new and challenging field where advancements demands new approaches to the efficient running of buildings and the facilities they contain.

3.0 METHODOLOGY

The sources of secondary data is through literature review from published works and guidelines retrieved from the Department of Building, ABU Nigeria. Primary data was collected from MFM students (respondents) through a survey using a self-administered structured questionnaire. Fellows and Liu [14] opined that the questionnaire is a widely used approach for surveys.

Judgmental sampling as a non-probability sampling is adopted for this study because according to [15], judgemental sampling can be selected based on the judgement of the researcher that respondents meet the specified criteria for the study. As a means to justify this decision, all the respondents in this study are MFM students which is the basic criteria for this study.

All forty nine students enrolled in MFM in 2013/2014 Academic Session in ABU Nigeria which constitutes the study population will equally serve as the sample size for the study. This decision is informed by [16] where he states that 'if a study population is not large and if the sample will give results usually similar to a normal distribution, the study population can be adopted as the sample size which is subsequently sufficient for a small study'.

The ranking format adopted for this research will rely on the skill level of the respondents of each parameter studied which are: Very Skilled (4); Skilled (3); Unskilled (2); and Very unskilled (1).

Descriptive statistics will be used to describe the characteristics of the respondents such as their profession and years of working experience among others. Furthermore, inferential statistics will also be used to estimate the Mean and Relative Important Index (RII). Parametric statistics (mean) used to analyse data was however not enough and as such, further analysis using non-parametric procedures (RII) was adopted. As posited by [17], RII is a non-parametric technique widely used for ranking in built-environment related researches. The formula adopted for RII is as given by [18] is:

$$RII = \frac{\sum fx}{\sum f} x \frac{1}{k}$$

Where:
RII= Relative Importance Index ($0 \leq index \leq 1$: meaning that RII ranges from 0 to 1).
Σfx = Is the total weight given to each attribute by the respondents.
Σf = Is the total number of respondents in the sample.
k = Is the highest weight on the Likert scale.

This method uses weighted scores to rank the constructs studied which subsequently enables the researchers to cross-compare the relative importance among the constructs as perceived by the students.

4.0 RESULTS

All forty nine students studied duly completed and returned the administered questionnaire. Table 1 shows that out of the forty nine students, there are eight Architects, thirteen Builders, seventeen Quantity Surveyors, five Estate Surveyors, three Civil Engineers, two Mechanical Engineers and one Electrical Engineer.

Table 1 Number of students by profession

S/No.	Profession	Number of Students
1	Architecture	8
2	Building	13
3	Quantity Surveying	17
4	Estate Surveying	5
5	Civil Engineering	3
6	Mechanical Engineering	2
7	Electrical Engineering	1

Table 2 shows that fifteen students have 1-5 years of working experience, twelve students have 6-10 years of working experience, ten students have 11-15 years of working experience, nine students have 16-20 years of working experience and three students have over 21 years of working experience.

Table 2 Years of working experience of respondents

S/No.	Experience (Years)	Number of Students
1	1-5	15
2	6-10	12
3	11-15	10
4	16-20	9
5	>20	3

Table 3 depicts the ICT gadget mostly used for work by the respondents. Twenty one respondents mostly use desktops, twenty five students mostly use laptops and three students mostly use other devices such as tablet PC's and mobile phones among others.

Table 3 Electronic devices mostly used to work by students.

Electronic Device	Number of Respondents	Percentage (%)
Desktops	21	42.86
Laptops	25	51.02
Other devices such as tablet PC's, i-phones, mobile phones	3	6.12
TOTAL	49	100

Table 4 shows that 20 students spend 1-3 hours a day using ICT to work, 22 students spend 4-6 hours a day using ICT to work and 7 students spend over 7 hours a day using ICT to work.

Table 4 Time spent per day using ICT to work

S/No.	Number of Hours	Number of Students
1	1-3	20
2	7-6	22
3	>7	7

Table 5 shows the frequency of training and re-training in using ICT for work by employees of the students. Five respondents always' undergo training and re-training in using ICT, sixteen respondents 'sometimes' undergo training and re-training in using ICT, and twenty eight respondents 'never' undergo training and re-training in using ICT.

Table 5 Extent of ICT training and re-training

S/No.	Frequency	Number of Students
1	Always	5
2	Sometimes	16
3	Never	8

In order of ranking of all the ICT applications studied, the most used ICT applications to work among the students is Word processing, then spread sheet and then downloading using online databases (specifically for research). These ranked 1st, 2nd and 3rd. Furthermore, the least used ICT applications to work among the students are e-business, then teleconferencing and then creating web pages. These ranked 11th, 12th and 13th. Table 6 shows these results among others.

Table 6 Relative Importance Index of ICT applications

ICT application	Frequency of response				∑f	∑fx	Mean	RII	Rank
	1	2	3	4					
Business communication (such as sending and receiving e- mails)	1	7	30	11	**49**	149	3.04	0.76	**4th**
Downloading specifically for research (using online databases)	1	6	28	14	**49**	153	3.12	0.78	**3rd**
Entertainment and social networks (Facebook, Twitter)	3	13	16	17	**49**	145	2.96	0.74	**5th**
Word processing (such as MS Word)	0	0	28	21	**49**	168	3.43	0.86	**1st**
Spread sheet (such as MS Excel)	0	5	28	16	**49**	158	3.22	0.81	**2nd**
Graphics (Photoshop)	12	19	10	8	**49**	112	2.29	0.57	**10th**
Creating web pages (such as Dream Weaver)	20	18	9	2	**49**	91	1.86	0.46	**13th**
Presentation (such as MS PowerPoint)	2	9	29	9	**49**	143	2.92	0.73	**6th**
Teleconferencing and teleworking	14	24	11	0	**49**	95	1.94	0.48	**12th**
E- business (such as marketing, Job recruitment)	8	20	18	2	**49**	110	2.24	0.56	**11th**
GIS/Spatial data management (ARCGIS)	1	11	29	8	**49**	142	2.90	0.72	**7th**
Computer Aided Facilities Management	6	7	24	12	**49**	122	2.49	0.62	**9th**
Computer Aided Drafting (AUTOCAD, ARCHICAD, REVIT, BIM)	13	10	15	11	**49**	140	2.86	0.71	**8th**

5.0 FINDINGS AND CONCLUSION

Results reveal the following:

(i) All the students studied spend at least one hour a day using an ICT gadget to work;

(ii) The student's possess greater skills in using ICT in word processing, spreadsheets and downloading specifically for research (using online databases) than they do for the other 10 ICT applications studied; and

(iii) Even though over 69 percent of the respondents have over 6 years of working experience, only about 10 percent of the respondents 'always' undergo training and re-training in the use of ICT to work.

These findings clearly buttress the assertion by [8] that students need to become familiar with the tools and equipment (such as computers, software and hardware, databases, and others) they will be using and any ICT related skill. Therefore, they become professionals during their career partly through being able to perform and give support in terms of ICT. Similarly, these findings address the recommendations made by [11] that researchers are challenged to rethink how and why the role of ICT might affect FM organisations.

It may be concluded that considering the fact that FM is multi-disciplinary, the ICT skill competency of the students studied shows a deficit in more technical applications required to make them more competitive thus bridge the multi-disciplinary nature of the FM discipline. This is confirmed as showcased from the pool of seven professionals (Architects, Builders, Quantity Surveyors, Estate Surveyors, Civil Engineers, Mechanical Engineers and Electrical Engineers) enrolled in the MFM program. According to the recommendation made by [19], while it is important for Facilities Managers to keep on working as multidisciplinary and interdisciplinary, FM professionals must be practitioner-focused. Interpreting this assertion may imply that FM practitioners must be technically competent to practice FM by possessing contemporary skills that will make them meet up to their multidiscipline.

It may thus be recommended that the MFM curriculum must give more priority in teaching the ICT applications in deficit (such as Computer Aided Facilities Management and Building Information Modelling among others) so that the students can meet up with marketability requirements for FM practice upon graduation. Furthermore, the employers of the respondents must make available ICT training and re-training opportunities for their employees if they want them to be ICT compliant to best practices in the business of their organisations. The implication for this research infers that teaching and improving the MFM curriculum will equally equip the MFM program in ABU Zaria to being in line with world's best practice as is required by International Facilities Management Association (IFMA) and other professional and regulatory bodies. The limitations for this study are that it was specific to only students enrolled in MFM in 2013/2014 Academic Session in ABU Nigeria and as such the conclusions cannot be generalised.

References

[1] Iyanu, P. O. and Olumuyiwa, B. A. 2014. ICT Competencies of Built-Environment Students in a Nigerian Polytechnic. *8th CIDB Postgraduate Conference*. University of the Witwatersrand, Johannesburg.: 339-348.

[2] Best, L. A., Buhay, D. N., McGuire, K., Gurholt, S. and Foley, S. 2014. The Use of Web 2.0 Technologies in Formal and Informal Learning Settings. IGI Global. Hershey, PA :1-22.

[3] Marjolein, B. M. Z. and Jeroen, M. 2015. ICT in higher Education: Students Perceive Increased Engagement. *Journal of Applied Research in Higher Education*. 7(1): 2-18.

[4] Cabero-Almenara, J. and Marín-Díaz, V. 2014. Educational Possibilities of Social Networks and Group Work: University Students' Perceptions. *Comunicar*. 21 (42): 165-172.

[5] Jain, A. and Farley, A. 2012. Mobile Phone-Based Audience Response System and Student Engagement in Large-Group Teaching. *A Journal of Applied Economics and Policy*. 31(4): 428-439.

[6] Zietsman, M., E. 2008. ICT and Construction: Where are we? Proc. of IFIP Working Group. University of Pretoria Joint Workshop: 253-260.

[7] Anigbogu, N. 2012. Leapfrogging, Tunnelling Through and Overcoming: Meeting the Needs of Construction Education in Nigeria. *AARCHES BGM and Annual Conference*. University of Jos: 3-5.

[8] Hanadi, B., Mark, H. and Ian, M. 2011. ICT Skills and Employability Needs at the LIS Programme Kuwait: A Literature Review. *New Library World*. 112 (11/12): 499-512.

[9] Dodo, M., and Bilau A., A. 2014. Masters in Facilities Management and International Facility Management Association Professional Qualification. *International Journal of Management, Information Technology and Engineering (BEST: IJMITE)*. 2(1): 57-66.

[10] Association of College and Research Libraries. 2007. Information Literacy Competency Standards for Higher Education. American Library Association. [Online]. Available at: www.ala.org/ala/mgrps/divs/acrl/standards/standards.pdf .

[11] Ada, S. 2014. The Relation between Innovation Sources and ICT Roles in Facility Management Organizations. *Journal of Facilities Management*. 12 (4): 368-38.

[12] Ada, S. 2012. Managerial Perception of Service Innovation in Facility Management Organizations. *Journal of Facilities Management*. 10 (3): 198-211.

[13] Academic Brief of the Department of Building Ahmadu Bello University. 2012. 64.

[14] Fellow, R., and Liu, A. 1999. Research Methods for Construction. London: Blackwell Publishing.

[15] Awang, Z. 2012. *Research Methodology and Data Analysis*. Dee Sega Enterprises Selangor Malaysia.

[16] Gerard G. 2010. Basic Research Methods: An Entry to Social Science Research. Sage Publications, New Delhi.

[17] Sodangi, M, Khamdi, F., M., Idrus, A., Hammad, B., D., and Umar, A., A. 2014. Best Practice Criteria for Sustainable Maintenance Management of Heritage Buildings in Malaysia. *Fourth International Symposium on Infrastructure Engineering in Developing Countries Karachi*: 11-19.

[18] Abdullahi, S. 2014. The Impact of Outsourcing the Maintenance of School Hostels. Ahmadu Bello University. Nigeria: Masters Project.

[19] Junghans, A. Nils, O. E. O. 2014. Discussion of Facilities Management as an Academic Discipline. *Facilities*. 32 (1/2): 67-79.