

EFFECTS OF INCESSANT ELECTRIC POWER INTERRUPTIONS ON ICT INSTRUCTIONAL MATERIALS AND EQUIPMENT IN EBONYI STATE UNIVERSITY

Dr. James E. Ogbu

Abstract

This study investigated the effects of incessant electric power interruptions on information and communication technology (ICT) instructional materials and equipment in Ebonyi state university Abakaliki. The study was guided by two research questions and two corresponding hypotheses. The design adopted was the descriptive survey. A total of 142 ICT operatives were randomly sampled for the study comprising academic administrators with ICT installations and equipment in their control and lectures in involved in ICT driven instruction. Validated questionnaire with .89 reliability coefficient was used for data collection. Data was analyzed using mean and standard deviation to answer the research question why the hypotheses were tested with t-test statistics at .05 level of significance. The data analysis revealed among others that incessant electric power interruption destroys and causes malfunction of ICT instructional materials and equipment. It was therefore recommended that the university management should purchase appropriately rated standby generators to safe guide ICT instructional materials and equipment in their various campuses.

In science and technology, power is defined as the rate of doing work or the rate at which energy is being consumed or used-up in order to accomplish a certain task. This definition deviates a little from the concepts of political power or spiritual power which dwell more on ability to control others and influencing forces. In electrical and electronic systems, the concept of power is narrowed down to the rate at which

electrical energy is used to do work or consumed (Symonds, 2006). According to Shepherd, Morton and Spence (2006) electric power is the product of electric current and voltage. That is, electric power is the rate at which electric current is used to do work as long the electric pressure known as voltage is maintained or available.

Wherever the electric pressure is not available, electric current will cease to flow, consequently electric energy consumers will, immediately cry out that electric power failure or electric power interruption or what the journalists call power-outage has occurred. In the context of electrical energy supply and utilization, the above three terms mean the same condition whereby the electrical energy from the source of supply is no more reaching the consumer to utilize. Hence electric power interruption was defined as the break in the source of supply to the consumer temporarily (Turner, 2002). It is a situation when the electric current stopped flowing in and out of the load because the electric pressure from the source of supply was lost. Under normal condition of public electricity generation, transmission distribution and utilization, power interruption is usually very temporarily and very rare in occurrence, like once in a year or at most once in a month.

Unfortunately electric power interruption in Nigeria presently can last up to two weeks or even a month depending on factors only known by the Power Holding Company (PHCN)

authorities. When it is not long lasting at a stretch the frequency may be up to fifty times per day or more. Hence the term incessant power interruption, indiscriminate power failure, continuous power outage, perennial power failure, abrupt power disconnection or epileptic power supply in Nigeria by the PHCN. As a result of this incessant power interruption in Nigeria most electricity consumers strive to possess an alternative power supply to avoid total destruction of their installation and equipment or folding-up of their business undertaking leading to proliferation of portable generators, increased production cost and environmental degradation. The term electricity consumer refers an individual, domestic holding, industrial organization, government establishment or office that is connected to the national grid of PHCN and using the energy there from for their day to day operation or function.

This definition covers ICT (Information and Communication Technology) operatives with their installations and equipment connected to the public power supply system of PHCN. The ICT operatives with their installation and equipment are the most affected by the present incessant electric power interruption the whole Nigeria because of the nature of their power demand. ICT was defined in Etonyeaku (2010) as the study, design, development, implementation, support and management of computer based information systems, particularly software applications and computer hardware. Okojie (2010) also defined ICT as the collection, storage, processing and communication of information by electronic means. Information communication technology (ICT) comprises of computers, networks, satellite communications, robotics, videotext, cable television, electronic mail (e-mail), electronic games and automated office equipment (New World Report, 2006). Other

equipment involved in ICT include video systems, audio, Hifi systems and different cameras) electronic eyes. Yusut (2002) and Daniel (2002) concluded that ICT is an eclectic application of computing, communication technology, and a broad range of satellite technologies used in collecting, processing, storing, editing, retrieving and transferring of information globally in various forms. According to Landu (2010) ICT have provided innovation in teaching and learning processes and engendered advances in research and a rethinking in education.

In both education and other spheres ICT employ a lot of facilities, installations and equipment that are highly electric power demanding and very sensitive to incessant power interruptions, voltage surges, transient currents and power fluctuations.

ICT instructional materials and equipment are the most adversely affected by these incessant electric power interruptions in Ebonyi state university. Some of these affected materials include instructional compact discs both RAN and ROM, projector slides telephone lines and its accessories, computer mouse and many other materials in virsual lecture halls. Some of the affected ICT equipment for instructional use include computer hard disc, computer monitor, key-board, education television different projectors, audio tapes and cassettes and many other instructional ICT equipment.

The problem of this study is that many ICT operatives, complaints and lecturers that manipulate the materials and equipment for effective instructional delivery are grossly ignorant of the devastating effects of these incessant electric power interruptions on the materials and equipment they use daily. Hence they ignore the daily use of uninterruptible power supply to the detriment of the ICT

installations materials and equipment. Hence the general purpose of the study was to determine the effects of incessant electric power interruptions on the ICT instructional materials and equipment in Ebonyi State University Abakaliki.

Research Questions

- 1) What are the effects of incessant electric power interruptions on ICT instructional materials used in Ebonyi state university?
- 2) What are the effects of incessant electric power interruptions on ICT instructional equipment used in Ebonyi state university, Abakaliki?

Hypotheses

1. There will be no statistical significant difference between the responses of academic administrators and lecturers on the effects of incessant electric power interruptions on the ICT instructional materials used in Ebonyi state university.
2. The mean responses of academic administrators and those of lecturers on the effects of incessant electric power interruption on ICT instructional equipment will not be statically significant.

Methodology

Survey research design was adopted for this study and area of the study was Ebonyi state university. A total 142 ICT operatives were randomly sampled for the study comprising academic administrators overseeing instructional ICT materials and equipment (10-academic deans, 44-academic heads of departments) and 88-lecturers directly involved with ICT instructional materials and equipment (two lecturers per academic department). Structured questionnaire was the instrument used for data collection which was developed by the

researcher using a four-point response scale of: strongly Agree (4), Agreed (3) Disagree (2) and strongly (1) Disagreed. The instrument was face-validated by three experts: two from TVE Department and one from measurement and evaluation specialization unit. Test-retest method of reliability establishment was used with Pearson product moment computation yielding .89 coefficient of stability. The instrument was administered by hand with the aid of four research assistants, one per campus of Ebonyi state university presently; the questionnaire had 100% return, may be due to the high academic standard of the subjects. Mean and standard deviation were used to answer the research questions while students t-test statistic was used to test the hypotheses at .05 level of significance

Results

The results of the data analysis were presented in tables below in line with the research questions and hypotheses.

Research Question 1

What are the effects of incessant electric power interruptions on ICT instructional materials used in Ebonyi state university?

Research Hypothesis 1

There will be no statistical significant difference between the responses of academic administrators and lecturers on the effects of incessant electric power interruptions on the ICT instructional materials used in Ebonyi state university.

The results to the analysis of data pertaining to this research question and this research hypothesis are shown in table 1 below.

**Table 1:
Mean Ratings, Standard Deviation and t-test
Statistic of Responses on the Effects of
Incessant Electric Power Interruptions on
ICT Instructional Materials by Academic
Administrators and Lecturers**

S/N	Items Statement	Mean	SD	t.cal	Remarks
1	Incessant electric power interruption and its attendant voltage surges, sags, spikes, harmonics and transient current makes lecture notes in CD ROM to be lost (loss of data)	3.24	0.18	0.64	Ag NS
2.	Floppy diskettes are easily destroyed and now being phased out because of incessant electric power failures	2.92	0.19	1.81	Ag NS
3.	The number of access (writing and re-writing) CD RAM and its general life span is usually reduced by incessant electric power interruption	2.52	0.19	0.86	Ag NS
4.	Incessant electric power interruption and its associated voltages surges, spikes, sags, harmonics and transient currents causes computer mouse to be frozen	3.14	0.18	1.03	Ag NS
5.	Incessant electric power interruption destroys instructional projector-slides thereby distorting the lesson delivery	2.88	0.21	1.86	Ag NS
6.	Instructional cassette cartridges usually coil-up and destroyed as a result of incessant electric power interruption	2.99	0.36	1.63	Ag NS
7.	Data corruption and unexpected data loss in instructional flash drives are on the increase due to incessant electric power interruption and voltage surges	3.01	0.19	0.67	Ag NS
8.	Flickering pictures and ghost lineages in projection screens or white boards resulting from voltage sags, spikes and surges make ICT driven instruction loose its meaning	2.81	0.42	0.77	Ag NS
9.	ICT cables and wires usually developed short-circuit or open-circuit faults as a result of incessant electric power interruption and voltage surges	3.45	0.15	1.64	Ag NS
10	Instructional modems develop malfunctions faults and reduction in data transmission speeds	2.65	0.22	0.97	Ag NS
11	Incessant electric power interruptions and its voltages surges causes burn-outs and partial contacts inside local-network-connectors	2.99	0.34	1.36	Ag NS
12	Voltage spikes, surges, sags and transient currents associated with power failures often causes premature failure of ICT installations power input protective devices.	2.55	0.26	1.12	Ag NS

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13.	Internet browsers and other sensitive ICT instructional softwares develop glitches and functional errors as a result of harmonics, RFI or EMI introduced by incessant electric power interruption	2.67	0.57	0.64	Ag	NS
14.	ICT telephone lines used for instructional purposes often get flashover and destroyed by power outage voltage spikes and surges	3.11	0.28	0.83	Ag	NS
15.	Power input cables and wires often develop short-circuit faults and throw the whole ICT installation into permanent black-out as a result of incessant electric power interruption	2.73	0.21	1.15	Ag	NS
Grand mean (\bar{x})		2.91				

Table 2
Mean Ratings, Standard Deviation and t-test Statistic of Responses on the Effects of Incessant Power Interruptions on ICT Instructional Equipment by Academic Administrators and Lecturers.

S/N	Items Statement	Mean	SD	t.cal	Remark
1.	Computer hard disc (processor) used for ICT instructional purposes often get corrupted and crashed due to incessant electric power interruptions and its associated voltage surges, spikes and sags	3.15	0.25	0.23	Ag NS
2.	Incessant electric power interruption usually burn ICs in computer monitor, causing loss of pictures and disruption of ICT driven lectures	3.18	0.74	0.81	Ag NS
3.	The major cause of computer keyboard stiffing, contacts and cable burn-out is the incessant electric power interruptions	2.88	0.56	1.13	Ag NS
4.	Incessant electric power interruption destroys the colour fidelity and delivery of computer colour printers	3.24	0.91	0.66	Ag NS
5.	Reproduction capability of computer scanners are usually reduced, distorted or destroyed by incessant electric power interruptions	2.62	0.19	0.88	Ag NS
6.	Some instructional audio-tape recorder and player get their motor burnt and stop functioning as a result of incessant electric power interruption	2.71	0.26	1.07	Ag NS
7.	Education televisions often develop circuitry faults after repeated power failures and voltage spikes	3.58	0.61	0.64	Ag NS

Research Question 2

What are the effects of incessant electric power interruptions on ICT instructional equipment used in Ebonyi state university, Abakaliki.

Research Hypothesis 2

The mean responses of academic administrators and those of lecturers on the effects of incessant electric power interruption on ICT instructional equipment will not be statically significant.

The results to the analysis of this research question and this research hypothesis are shown in Table 2 below.

8.	Multimedia projectors (Audio/visual projectors often develop asynchronous faults due to incessant power interruption	2.66	0.93	1.13	Ag	NS	internet based learning
9.	Transformer and suppressors inside ups units often get burnt as a result of voltage spikes and surges arising from incessant electric power failures	2.57	1.21	1.34	Ag	NS	15. Triple clicking a webpage before it loads and other computer operation anomalies are always due to incessant voltage surges, spikes, sags, undue harmonics and power interruptions
10.	Photocopying machines used in visual lecture halls often develop rolling-stock jam and even destroyed due to incessant electric power interruption	3.68	0.14	0.47	Ag	NS	2.74 0.89 1.17 Ag NS
11.	Power-point projectors used for instructional purposes often develop the faults of scrambled data or systems crash as a result of incessant electric power interruption	2.71	1.16	1.26	Ag	NS	Grand mean (\bar{X}) 3.04
12.	CD-writers fail, or write corrupted data as a result of incessant electric power interruption, voltage spikes, surges, sags and transient currents.	2.60	1.11	1.09	Ag	NS	
13..	Instructional computers do not often turn on, giving only little green flashing light as a result of power surges and incessant interruptions	3.77	0.15	0.51	Ag	NS	
14.	Power surges and incessant interruptions cause internet services to turn on and off in the computer system thereby disrupting	3.51	0.23	0.86	Ag	NS	

Key:

N: = 142; NAP = 54 (Number of academic administrators NL = 88 (Number of ICT Lectures

NS = Not significant

t-table = critical t-value = + 1.96

t-cal = calculated t values

df = 140 = (54+88-2) and p < 0.05

Tables I and 2 showed the result of data analysis where each research question was answered along side with the corresponding hypothesis test result. The tables showed that all the items were agreed to be adverse effects of incessant electric power interruptions to ICT instructional materials and equipment. All the hypotheses were also upheld.

Summary of Findings

Based on the analyzed data, the following findings were made

1. Incessant electric power interruption cause loss of data in the memory of ICT materials such as CD ROM and others.
2. Floppy diskettes are easily destroyed and now being phased-out because of incessant electric power interruptions.
3. Life-span of ICT materials and equipment are shortened by incessant power interruptions with its associated voltage surges, spikes, sags and transient currents.

4. Incessant power interruptions cause malfunction of many ICT instructional materials and equipment e.g freezing of mouse, ghost pictures in monitor etc.
5. Generally many ICT instructional materials and equipment are destroyed randomly and replaced leading to grave loss of fund and lecture sessions.
6. Data corruption and burning out of ICT instructional materials, equipment and installation principally originate from incessant electric power interruptions.

Discussion

The findings of this study actually indicated 15 extricated specific adverse effects of incessant electric power interruption on both ICT instructional materials and also 15 on equipment. These 30 specific effects were summarized into six direct effects of incessant electric power interruptions.

All the questionnaire items were correctly filled and agreed to by all the subjects. Also the t-test analysis showed that the subjects spoke with averagely one voice, hence all the hypotheses were upheld. This showed that the subjects were well informed academic and ICT complaints who understood the seriousness of the problem to the electronic based academia. Their responses agreed with park (2012) who declared based on his engineering researches that incessant electric power interruptions throw ICT materials, equipment and installations into grave damages, destructions, malfunctions, loss of data, corruption of expensive data, daily replacement of costly components, materials or equipment.

Mac (2011) outlined what he called hidden damages of incessant electric power interruptions and its associated voltage surges, spikes, sags, harmonics and transient current; to

include the following (1) loss of customers (to this study= students) (2) extra repair cost (3) daily equipment replacement cost (4) frustration and discouragement of students (5) Manpower and man-hour extra cost (6) general revenue loss. Mac (2011) hidden damages are all thrown open in this study and these have shown the relevance of this study.

Recommendation

Based on the findings of this study the following recommendations were made.

1. The power sector reform agenda of Federal Government should be taken seriously in other to eradicate incessant electric power interruptions, so that Ebonyi state university that is also connected to the national grid can enjoy uninterruptible power supply.
2. Ebonyi state university management should install and maintain appropriately rated stand by generators in her campuses with the necessary uninterruptible power supply systems in other to save ICT instructional materials and equipment from total destruction by the present wave of incessant electric power interruptions.
3. Academic deans and heads of departments should purchase small sized generators and uninterruptible power supply equipment for their own personal ICT installations.

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Dr. James E. Ogbu
Department of Technology and Vocational Education,
Ebonyi State University,
Abakaliki.