A systematic approach for educators and learners to improve the utilization of ICT resources for education at Aljamea Tus Saifiyah University Nairobi, Kenya

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ABSTRACT
The purpose of the study was to examine the Systematic Approach for Educators and Learners to Improve the Utilization of Information Communications Technology Resources for Education at AlJamea-Tus-Saifiyah University, Kenya. The study was guided by the following research question: How can utilization of Information Communications Technology resources be maximized in Aljamea-tus-Saifiyah for educators and learners? The study was anchored in System's Theory. The target population comprised of all educators, administrators and learners in AlJamea-Tus-Saifiyah University, Nairobi, Kenya. Stratified Sampling Technique was used to select a sample teachers and students to participate in the study. Questionnaires and direct observation guides were used as data collection instruments. The research instruments were subjected to both content and face validity. Quantitative data was cleaned, coded and entered into a computer to generate frequencies that summarized data. The summarized data was presented in frequency distribution tables. Key findings showed that the existing IT department which is only responsible for administrative jobs like procurement, installment and troubleshooting of the Information Communications Technology resources cannot be considered responsible for maximizing the academic use of Information Communications Technology resources present at AlJamea-Tus-Saifiyah University. Thus, it was concluded that there is a need of a proprietary academic department which deploys a systematic approach in developing digital pedagogical content optimized for Information Communications Technology environment at AlJamea-Tus-Saifiyah and in consistent training of lecturers and students to make the most use of the Information Communications Technology resource present at AlJamea-Tus-Saifiyah University.

I. BACKGROUND TO THE STUDY
ICT is the new wave of technology driving virtually every activity in the world today. Modern day life has exposed individuals from all social strata to technology and communication. A child entering any educational institution has either experienced or become proficient in the operation of technological gadgets in various efficacies ranging from gaming to self-learning. Education has advanced with technological developments, so have traditional classes turned into smart classrooms. An esteemed visionary, the Late His Holiness Dr. Syedna Taher Saifuddin RA, developed Al Jamea university's old branch in Surat (India). He clearly ordained each and every follower to make worldly developments subservient to their style of living. He created an order of achieving supremacy over this temporal world by using it for their supreme spiritual purpose rather than surrendering to it. This philosophy reflects Al Jamea's attitude towards all the emerging inventions and discoveries in Educational Technology. He States in his eloquent arabic verse (1960):

استخدم الدنيا ولا تك خادم   *   الدنيا تعزر في الورى وتوقر

Bring the world unto your service, do not get servile to this world; So, you will be dignified and honored among all its people.

Al Jamea is an arabic academy for higher education of the students who are selected from all over the world from the Dawoodi Bohra community. It has seen various developments, in regard to educational technology, throughout history. In the early 1980's language laboratory concept was introduced to make the best use of technology in educating students for local intonation of Arabic and English language. Along with that, professors at Al Jamea had started using overhead projectors with transparencies to show various skills to their students. Calligraphy was done using these types of transparencies and handwritten letters were projected on screen to enhance students' skills in this field. During the 1990's Al Jamea observed the age of digitalization of various manuscripts by its educators. In the 2000's, changes such as the establishment of core networking and servers made Al Jamea's educational process more interconnected than before. In 2012, the announcement of

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establishing a campus of Al Jamea at Nairobi was made by Late His Holiness Dr Syedna Mohammed Burhanuddin. At that time, the scheme of creating a state-of-art educational environment emerged. The challenges which were faced in establishment of technological surfaces in previous branches of Al Jamea gave a clear vision to the civil architects along with educational engineers. Thus, it was made imperative that the whole campus shall be a smart and technologically absorbent one, becoming extremely similar to its physical magnanimity and sustainable landscapes. It's branch in Nairobi (AJSN) has emerged as a smart and radiant campus between its other campuses located in India and Pakistan respectively.

However, the fact is that resources alone cannot suffice in producing technologically-able strata of educators and learners. There should be a systematic approach towards utilization of ICT resources which is put into action for training and educating teachers and learners at the same time. The vision of Al Jamea states that proficiency in various skills should be achieved by itschildren, be them educators or learners. However, ICT skills keep on evolving and their continuity in development poses a challenge to the ability of educators and learners who are trying to get proficient in it. This study will explore the challenges faced by educators at AJSN in utilizing ICT resources present in the campus. It will also try to highlight the fact that any academic environment in this age of ICT will only flourish by maximizing the utility of ICT resources.

Theoretical Framework

This study was guided by the paradigm that has controlled systems of educational technology and educational development since the 1970's - the **systems approach**. This approach was a result of the General Systems theory.The term "general systems theory" originates from Bertalanffy's general systems theory (GST). In the most general sense, System means configuration of parts connected and joined together by a web of relationships. The Primer Group defines System as a family of relationships among the members acting as a whole. Von Bertillon defined the term System as "elements in a standing relationship." It should be remembered that A system has an objective or mission to be achieved by a healthy interaction of its sub elements.Systems approach as a process by which needs or problems are identified and requirements for the problems' solutions are selected from alternatives; Methods and means are obtained and implemented; results are evaluated and required revisions to all or part of the system are made so that the problems are eliminated.According to Arnold and Wade (2015) Systems thinking is a set of synergistic analytic skills used to improve the capability of identifying and understanding systems, predicting their behaviors, and devising modifications to them in order to produce desired effects. These skills work together as a system.

Considering an organization as a set of Systems which have sub elements interacting with each other and applying this approach in setting a layout for each and every element in a scientific manner so that problems are simulated and solved before they arise, can be termed as the Systems approach. In a system approach, certain steps are followed in a logical way, with certain steps being essential and therefore indispensable. It requires all the elements of an organization to be a part of a supra-system and operate within their designated subsystem.Coming to the systems approach towards educational technology, it refers to combining ideas and practices drawn from different fields such as sociology, psychology, business management with developments in more technical fields such as optics, reprography, acoustics, and computer science in order to produce the optimum learning or teaching system. The educational development or innovation which is **systematically** and **scientifically** planned and executed, is the 'systems approach' to educational technology.This approach implies that scientific methods should be used while adapting any technology for education. Thus, it strengthens this study's epicentral thought of maximizing utility of ICT resources. It guides the research to come to specific plans which can be executed in this regard. Moreover, this approach also pushes educators to combine various fields of knowledge and their experiences in teaching those subjects with any new technology which is being adapted for their academic perusal. This way, the Systems approach strengthens the study's overall layout.Concluding the theoretical framework of this study, it must be said that Systems approach is best fit for the scope of this study as it helps in understanding the challenges and its solutions. It also gives a broader vision to the researcher in perceiving the picture of ICT resources and its utility at AJSN and to measure the extent of effectiveness in this regard.

Conceptual Framework

This study aimed at exploring the extent of utilization of ICT resources in AJSN and proposing a solution for maximizing the same for better teaching and learning experience. The workflow of educational technology in any academic institution is similar to the IPO model of information processing. It starts with acquiring new gadgets or technologies by academic institutions upon receiving inputs in the form of needs expressed by teachers and learners. After procurement and installation, the curriculum is processed using the ICT resource for providing better output of teaching and learning. The institution receives constructive criticism in form of feedback from teachers and learners which enables the process to rejuvenate again and again. The following figure shows conceptual framework of this study:
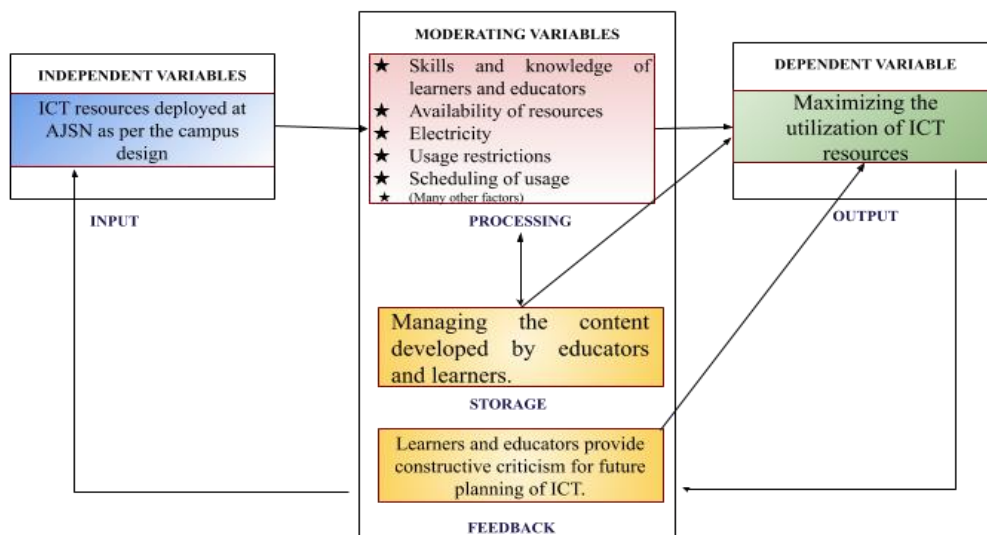
The independent or controlled variables are the ICT resources which have been installed and deployed at AJSN. These are used by the educators and learners and range from smart projectors for classrooms to computer labs for individuals. Whereas the intervening variables are the knowledge and skills used to process the resources for academic purposes. The time required for unleashing the benefits of an ICT resource and their availability in terms of electricity, schedules for students, technical assistance for troubleshooting etc are also the moderating or intervening variables in this study. The output or the dependent variable is measuring the extent of utilization of ICT resources in academic and economic terms. The utilization of ICT resources can vary according to the understanding and knowledge of the user. Thus, measuring the extent of utility will be focused on methods deployed for using the ICT resource and range of time exhausted in it rather than potential possibilities and probabilities of the said resources. The feedback which is received for developing and changing methods and strategies is also a moderator for determining future needs which symbolizes the initiation of the cycle once again.

II. REVIEW OF RELATED LITERATURE

The integration of ICT in teaching and learning brings about powerful learning environments and helps students in general and educators in particular to deal with knowledge in active, self-directed and constructive ways. The factors underpinning this integration of ICT in teaching and learning were examined by some researchers from the College of Education and External Studies, Makerere University. They reviewed 6 theories in this regard in an article published by The Makerere Journal of Higher Education in 2017.Considering the nature of this research, two of these theories are selected here for guiding the path of this study:
1.   The Theory of Planned Behavior (TPB)
2.   Technological Pedagogical Content Knowledge Framework (TPCK)

The Theory of Planned Behavior (TPB)
This theory was developed by Ajzen (1991), and has actual behavior (AB) as the main variable. Ajzen describes that **Actual Behavior is predicted by both behavioral intention (BI) and perceived behavioral control (PBC)**. The TRA (theory of reasoned action 1980) posits that Actual behavior is a result of behavioral intention only. Whereas TPB postulates another dimension influencing Actual behavior which is Perceived Behavioral control (PBC). Ajzen (1991) defined Behavioral Intention (BI) as an indication of a person's readiness to perform a given behavior. BI is determined by the attitude toward the behavior (ATB) in question, the pertinent subjective norm and PBC. The Attitude Toward the Behavior is influenced by behavioral beliefs and outcome evaluations (bboe). Whereas Subjective Norm is influenced by normative beliefs and motivation to comply (nbmc). And PBC, according to him, can be described as the perceived ease or difficulty of performing the behavior. He posits that PBC is determined by control beliefs and perceived facilitation (cbpf). Control beliefs (cb) are the perception of availability of skills, resources and opportunities; and perceived facilitation (pf) is the individual's assessment of the importance of those resources to the achievement of outcomes. Fig.4 demonstrates the theory illustratively.
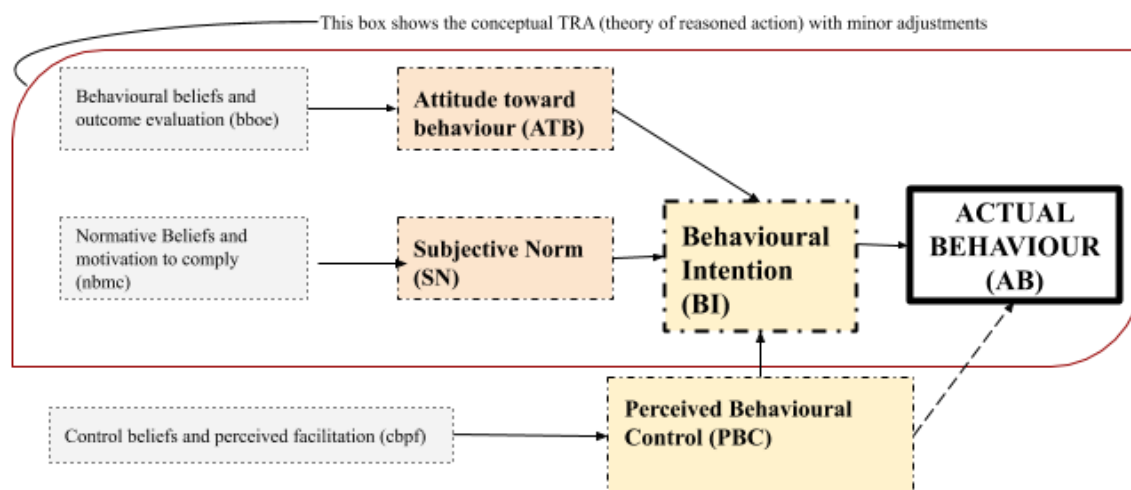
Source: Ajzen (1991), page 182, Figure 1

The actual behavior in the case of this study must be termed as Resource Utilization. This behavior is explored by the current research and the factors which need to be addressed in the course of amendment for this AB are to be realized throughout its course of study. Despite all the factors affecting AB in this theory, being crucial for the current research about AJSN, one factor which is most relevant to the nature of this study is the PBC affected by cbpf. The student or educator's perception of availability of skills, resources and opportunities and his assessment of the importance of those resources to the achievement of outcomes determines his perceived behavioral control (PBC) which determines his/her Actual behavior of resource utilization.The TPB helps an academician to identify challenges faced during delivery of educational work. It also summarizes the factors which need to be considered for an educator or a learner during their interaction with ICT resources. All these major findings have helped this study in preparing its research tools and in formulating its data collection framework. These factors have also clarified to the researcher that not every educator and learner can be the best at utilization of ICT resources. Thus, it provides a need for designing a systematic approach towards maximizing ICT resource utilization at AJSN.

Technological Pedagogical Content Knowledge Framework (TPCK)

Mishra and Koehler (2006) developed the Technological Pedagogical Content Knowledge (TPCK) framework. They posit that a teacher depends on three domains of knowledge for effective integration of ICT into teaching and learning. The domains are content knowledge (CK), pedagogical knowledge (PK) and technological knowledge (TK). They defined CK as knowledge about the actual subject matter that is to be learned or taught. Mishra and Koehler observed that a teacher must know and understand the subject that he/ she teaches, including knowledge of central facts, concepts, theories, and procedures if the teacher is to integrate technology in teaching.And PK according to them, is the deep knowledge about the processes or methods of teaching and learning (e.g. values and aims, classroom management, lesson planning, and student evaluation). They argued that a teacher with deep PK is likely to integrate technology in his or her teaching considering how students can best learn in a given classroom context and nature of learners. TK according to them, is knowledge about standard technologies, such as books, chalkboard, and more advanced technologies such as the Internet and digital video and how to operate those technologies. They asserted that a teacher with TK has good knowledge of operating system and computer hardware, the ability to use standard sets of software tools (e.g. word processors, spreadsheets, browsers, e-mail, etc.) and how to install and remove peripheral devices, install and remove programs, create and archive documents among others.The interaction of these three knowledge domains; CK, PK and TK gave rise to three paired knowledge domains namely pedagogical content knowledge (PCK), technological content knowledge (TCK) and technological pedagogical knowledge (TPK). PCK, is the knowledge of pedagogy that is applicable to the teaching of specific content such as knowing what teaching approaches fit content, and likewise, knowing how elements of the content can be arranged for better teaching. TCK, is the knowledge about the manner in which technology and content are reciprocally related. A teacher needs to know not just the subject matter he/ she teaches but also the manner in which the subject matter can be changed by the application of technology. And TPK, is knowledge of the existence, components and capabilities of various technologies as they are used in teaching and learning settings and conversely, knowing how teaching

might change as the result of using particular technology.TPCK is the intersection of all the three bodies of knowledge (CK, PK & TK) represented by three overlapping closed curves.

This theory gave a broader insight for the current study. It enlightened the concept of intersection between three domains of knowledge for effective integration of ICT in teaching and learning. Intersection signifies that isolating any one of these domains makes the utilization of ICT resources more abrupt than apt. This theory gave the study,the dimension of human intellect coinciding effectively with ICT resources while utilizing it for the purpose of education. A traditional content master cannot create effective presentations until he becomes a master of technological content also. Whereas a technological content proficient educator or learner won't go deep if he/ she lacks pedagogical content knowledge. All three domains must get combined for a better ICT resource utilization scenario to the institution. This theory provided a need for continuous human analysis of the ICT resource utilization and development of innovative forms of utilities for educators and learners. Thus, this theory shaped the skills which should be possessed by an effective systems administrator who shall overlook upon the process of ICT resource utilization.This study used the TPCK to analyze the sample population according to these three domains and later for identifying solutions for more efficient ICT Resource Utilization at AJSN.
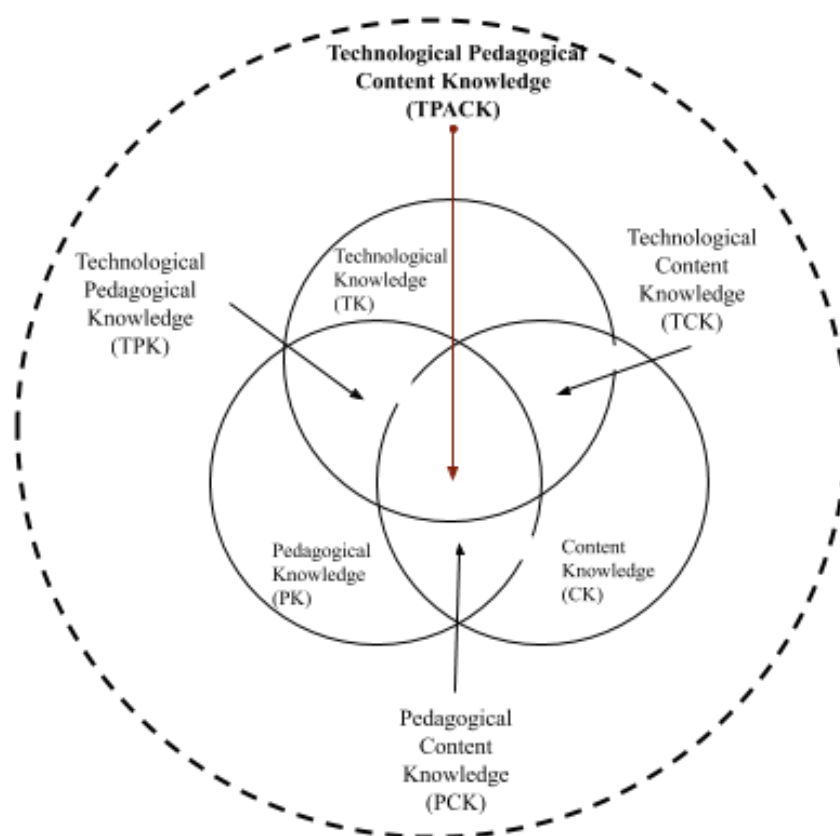
Source: Mishra & Koehler (2006), page 1025, Figure 4.

In today's knowledge economy more and more attention is paid to the higher education sector, the main producer of human capital and knowledge. Aspiring to contribute to the production of human capital and knowledge, which is deemed as the "driving force" of economic growth (Romer, 1986; Lucas, 1988), governments increase public financing to the educational sector. The educational sector invests in various resources including ICT. Thus, measuring ICT resource utilization and increasing efficiency in the same contributes to the country's economy as well as upgrading their human resources to a new level.Many studies have been conducted in order to measure resource utilization in the industry of education. Calculating the costs involved in procuring the resource against the output gained by that investment is a traditional way of measuring. Do university units differ in the efficiency of resource utilization? A case study was conducted upon this subject by Zara Daghbashyan (2009) for the Royal Institute of Technology in Sweden. It was a result of previous studies which catered resource utilization efficiency of universities compared to the best performing ones in sample. This study surveyed differences in resource utilization efficiency between units of the same university providing a unique opportunity of quantifying different teaching and research outputs while

controlling for quality. The science of measuring resource utilization is very beneficial for formulating financial policies and even raising the bar of efficiency in human resources involved.Studies have shown us the trends of ICT in education and the development of instructional aids and methods throughout history is commendable. Technology has evolved a lot and education's sustenance in front of technology has raised a lot of questions on efficiency of educators which in turn reflected on efficiency of students who are the future workforce.

III. RESEARCH DESIGN AND METHODOLOGY

This study used Correlation Survey Design for quantitative data collection and case study method in qualitative data collection. Correlation studies involve the collection of data on two or more variables on the same group of subjects then computing the correlation coefficient. The correlation survey in this study helped compare the degree to which ICT resources implementation and utilization are related.ICT in itself is a multi-faceted entity, thus for exploring its possibilities and maximizing the utility of ICT resources at AJSN, this study collected objective as well as subjective data and analyzed both from "objective outsider" and "subjective insider" viewpoints.The case study of the ICT resources' design-intent at AJSN and the existing challenges in unleashing its full potential, explored individual levels towards utilizing ICT resources and it also investigated the best institutional practices towards the same. Consequently, the results of this study highlighted subjective (individual), inter-subjective (language-based, cultural, discursive) and objective (material and causal) realities in the AJSN campus by gathering positive value from both types of data.Two main ideologies were in consideration while analyzing the data obtained from the Research instruments. First was the TEV analysis and second was the TRA and TPCK model which were reviewed earlier. These ideologies helped frame the findings into a meaningful solution.

IV. FINDINGS OF THE STUDY

The objective of the research question about exploring solutions for maximizing utility of ICT resources at AJSN was to address the probability of having a proprietary department for understanding best practices in utilizing ICT resources at AJSN which deploys a systematic plan in increasing the academic output from the ICT resources available.Therefore, the research put a mixed paradigm at work to obtain results about this research question. Some solutions were provided to the respondents, while subjective comments were welcomed from them.

Suggestions proposed by students and lecturers to increase utilization of ICT resources at AJSN

Sno.	Suggestions	Frequency	Percent
1	Content development	22	34.92
2	Student and teacher Training	19	30.16
3	Ease restrictions	16	25.4
4	Updating Computer lab hardware	6	9.52
	Total	**63**	**100**

As observed, developing digital content optimized for AJSN academically, was suggested as a solution to overcome hindrances at utilization of available ICT resources by 35% of respondents. While, 30% observed that training teachers and students is as well important to increase resource utilization. Whereas, 25% suggested that easing restrictions from using resources may invite more students and teachers to utilize ICT resources. A very insignificant number suggested that updating hardware is also a factor to improve resource utilization.

Another aspect for answering the research question, was to suggest whether any existing academic department is available for helping in maximizing ICT resources for education. The researcher had nominated some academic departments for this reason. The lecturers were asked to rate themselves in taking assistance from nominated departments in this regard. Data gathered is indicated in the following table.

Department	Not Applicable	Rarely	Sometimes	Always
Principal	28 (58.3)	8 (16.7)	2 (4.2)	10 (20.8)
Head of sections	22 (45.8)	2 (4.2)	14 (29.2)	10 (20.8)
Cultural activities	34 (70.8)	6 (12.5)	8 (16.7)	()
Radiant Quranic Arts	34 (70.8)	6 (12.5)	6 (12.5)	2 (4.2)
Extra-curricular male	30 (62.5)	10 (20.8)	8 (16.7)	()
Extra-curricular female	30 (62.5)	12 (25.0)	4 (8.3)	2 (4.2)

The researcher addressed the need of a systems approach and necessity of a proprietary ICT for education department at AJSN in the interviews conducted. This activity brought about the following analysis:

First of all, the scope of current ICT department is limited to administrative management of ICT resources at AJSN. Students are not directly in contact with them.Secondly, the ICT department is consistently making tutorial videos providing students and lecturers various vistas of possibilities to unleash more utility from current resources. But as the argument developed it was found that TEV analysis of the current resources has not been performed yet formally, and the administrators have already scheduled this analysis in their calendar of events.Thirdly, as described by the Theory of Planned behavior (TPB), the behavioral pattern of AJSN students and lecturers are constantly monitored by the administrators in order to affect their BI (behavioral intention) and AB (actual behavior). This evolutional character of utilization makes the need of a systems approach more evitable for administrators. The administrators constantly liaise with lecturers to find about best practices performed in classrooms in utilization of ICT resources. This activity is not under the core responsibilities of the department but it has shown its benefits to students and lecturers both.Lastly, the current utility report which is still unstructured at the administrative end, shows that lecturers and students are already aware about the challenges and try to bring solutions at individual ends. The need of a wholesome approach and a designated ICT for education department concretized more due to these findings.

V. CONCLUSION

The research concluded that AJSN must ensure that a proper systematic approach is deployed either by one its academic departments or by a new proprietary department of ICT for education only. This department should work in hand with the administrative ICT department and it should assume sole responsibility for:

a) developing pedagogical technical content optimized for ICT resources available at AJSN

b) training lecturers and students to unleash most of the potential in those resources.

The Alternative Hypothesis was accepted for this study was accepted by rejecting the null hypotheses and it was established that there is a significant statistical harmony between deploying a systematic approach by academicians for educational technology and maximizing utility of ICT resources for education.

VI. Recommendation

TEV analysis is required to be performed over utilization of computer lab and results must be probed in detail in order to solve the problems faced by students in utilizing it.The digital content displayed at AJSN are an intellectual property of the academic institution, it should be managed and saved for future use. This task can be made a responsibility of the proprietary department of ICT for education at AJSN. It has also been recommended that the probability of considering ICT for education as a separate concept from only ICT can be probed further as a whole new area of research.A separate study over the blocking and filtering of easily available digital content and media for academic purposes can be conducted at AJSN and other campuses of AljameatusSaifiyah.

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