



# Utilization of Advanced Technologies in Knowledge Creation and transfer in South–South Nigerian Universities

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## Abstract

The study investigated the utilization of advanced technologies in knowledge creation and transfer in South-South Nigerian universities. Two (2) research questions and 2 hypotheses were answered and tested in the study, respectively. The design for the study was the analytical descriptive survey, the population was 7 federal universities in South-South Nigeria and sample was 450 Heads of Departments, selected using the census and proportionate stratified random sampling techniques. The instrument of the study was the validated 20-item Extent of Utilization of Advanced Technologies in Creation and Transfer Scale (EUATKCTS), designed by the researchers in the modified 4-point Likert scale model of Very High Extent (VHE), High Extent (HE), Low Extent (LE) and Very Low Extent (VLE), with a reliability index of 0.92, obtained using the Cronbach Alpha procedure. Mean and Standard deviation was used in answering the research question while t-test was used in testing the hypotheses at 0.05 level of statistical significance. The results of the study showed that the utilization of advanced technologies in knowledge creation and transfer in South-South Nigeria is to a high extent and very high extent respectively. The study also established significant and no significant difference between the mean ratings of male and female acting and substantive Heads of Department on the extent of utilization of advanced technologies in knowledge creation and transfer respectively in South-South Nigerian universities. The study concluded that South-South Nigerian universities are in the frontline of their universities who make use advanced technologies in knowledge creation and transfer although there are discrepancies in the extent of utilization in knowledge creation and transfer. Consequently, the study concluded that stakeholders in knowledge creation should continue to make provision for and encourage continuous utilization of advanced technologies in knowledge creation while all calling for concerted efforts for continuing use of advanced technologies in knowledge transfer for the scale of the knowledge economy.

Keywords: Utilization, Advanced technologies, Knowledge creation, Knowledge transfer, Universities.

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## INTRODUCTION

Educational systems at all levels of education in the international system are responsible for the introduction of members of the society into their respective societies' worthwhile knowledge, skills and values. This position agrees with the description of educational outfits in the part-breaking scholarly contribution by renowned philosopher of education, Harry Schofield, on what roles educational institutions play in society. According to Schofield (1990), educational institutions are charged with the responsibility of introducing the young in society into societies' worthwhile, knowledge skills and values from one generation to another. Going by this contribution, educational institutions are therefore considered as the custodian of communities' heritage and legacies for generations that are presently alive and those that are unborn. Little wonder, scholars like Oluwo and Afangideh (2009), saw educational institutions as propagators of societal knowledge, skills and values for posterity. However, it is important and expedient to note that, quite very recently, some scholars have introduced currency into the activities and roles of educational institutions, as those institutions of the society that are responsible for introducing the younger, needing and desiring members of the society into societies' stock of knowledge, skills and values.

From the foregoing, it would therefore not be an understanding to summarize that educational institutions are centres of socialization, social change and custodian of societies cultural heritages. This may explain why societies place so much value on their educational system.

One of the key characteristics of the education systems is that they are operated in levels. In the Nigerian school system, there are basically three level of education (Federal Republic of Nigeria; 2014). There are senior secondary and tertiary levels of education. While the basic level of education sees to primary and junior secondary education of societal folks, the senior secondary level of education takes charge of senior secondary education while the tertiary level of education takes charge of higher education studies

In this study, the researchers are interested in the tertiary level of education in the universities in particular. Consequently, the proceeding section of the reviews will be on universities.

Universities are institutions of the society that are responsible for teaching, research and community service (Obomanu, 2008; Anya, 2013). Differently, Afangideh and Nwideduh (2010) add a fourth role to the universities. For the researchers, universities also perform what are technically referred to as incidental functions. These functions in the contribution from Afangideh and Aleru (2014) are those which universities involve themselves in entrepreneurial activities to raise their revenue bases as autonomous institutions in order to attain a level of self-sufficiency. It is the question of incidental roles that universities now run consultancy outfits, poultry farms, micro-finance bank. Base on the foregoing, universities as institutions of higher education can conveniently be seen to be performing the roles of teaching, research community service and incidental functions.

From four identified roles of universities, among them teaching, research, community service and incidentals, two of them are basically academic. These are teaching and research. In the aspects of teaching and research, one important concept is the article of operation. This is the question of knowledge. Teaching and research activities in universities are knowledge-based. This may be explained in the fact that, the whole concept of knowledge translates to knowledge management, which approximates knowledge creation, knowledge transfer and knowledge

sharing. While knowledge creation describes the construction of new knowledge, in the collaborative process, based on the individuals which is then combined in a synergistic way (Ulrike, 2024), knowledge transfer is specifically about how to work out a plan to get critical know-how from employees who are leaving to those who are staying (Goldstein, 2022). Also, Cx Team (2023) perceived knowledge transfer as sharing or disseminating knowledge, expertise, skills, information, or experiences from one individual, team, department or organization to another. Knowledge sharing is related to knowledge transfer and is the practice that promotes the exchange or transfer of learning from one individual to another and it makes for the mutual exchange of employees' learnings, ideas, skills, knowledge and experience (BisPortal365, (2025)

Traditionally, knowledge management activities or knowledge creation and knowledge transfer used to be done in the school system through the traditional modes of exchange of information, among them direct face to face communication (verbal) written communication, paralinguistic signposts, experiments, cultural displays, dancing, sports, debates, quiz and other means of communication and interactions. Later, technology crept in and changed the techniques of knowledge creation and transfers and gradually, advanced technologies have been introduced into the processes of knowledge creation and transfers. As a result, the proceeding section of the review will be on advanced technologies and how they are used in knowledge creation and transfer in organizations, among them schools.

### **Advanced Technology**

From a literally perspective, technology may be seen as the application of scientific principles in finding solutions to problems of man and humanity. From the obscure state of crude technology from the beginning of man, technology has traveled and metamorphosed into the present state of advanced technology. Advanced technologies are technologies that are at the cutting age and are the highest form of technology available, the most complex and the newest in the market. For Gartner.com (2025), advanced technologies are technologies that are still immature but promises to deliver significant value or that has some technical maturity but still have relative few users. Based on the foregoing presentations, advanced technologies; can conveniently be referred to as the latest available technologies that make themselves amenable to finding solutions to the problem of man and society.

Advanced technologies are many and diversified. Some of these technologies include Artificial intelligence, Block chain, Advanced robotic, Augmented reality, Internet of things, Robotics, Quantum computing, Biotechnology, 3D printing, 5G expansion and Cream energy technologies. Others include Smart bicycles, Smart phones, Vehicles vertical farming, Nanotechnology, Flight and Virtual reality. These various technologies are used in knowledge creation and transfers.

### **Advanced Technologies in Knowledge Creation**

Scholars and researchers in educational management and related fields have presentations on the advanced technologies that are helpful in knowledge creation activities. These technologies include Generative Artificial Intelligence, Quantum Computing, 5G Expansion, Virtual Reality (VR), Augmented Reality (AR) Internet of Things, Biotechnology in Agriculture, Autonomous Vehicle, Block Chain and Edge Computing (Afangideh, 2009; Dajv U.W Orji, Personal Communication, Jan 07, 2025; U.J Nwogu, Personal Communication, January 05, 2025 and E.S. Fomsi, Personal Communication January 09, 2025).

## **Advance Technologies in Knowledge Transfer**

Significant stakeholders in knowledge management in educational institution and sundry organizations agree that, advanced technologies play significant roles in the knowledge transfer processes. Advanced technologies that make themselves amenable in the knowledge transfer processes are Machine learning, Immersive reality, Enterprise social network (esn), Realtime collaboration platform, Learning management systems (LMS), Knowledge management systems (kms), Visual collaboration tools, Wiki and knowledge base software, Document collaboration tools, and Enterprise content management (ecm) (Afangideh, 2009) U.W Orji (Personal communication, January 06, 2025; Afangideh, 2010; N.M Abraham, Personal Communication, January 06, 2025).

## **Statement of the Problem**

As a response to advancements in science and technology, stakeholders in knowledge creation and transfer in institution of higher education, including universities, believe that if the necessary knowledge is to be created and transferred for the benefit of the modern knowledge economy, advanced technologies should be utilized in knowledge creation and transfer processes. As a result, most universities have invested in the purchasing and installing of the needed technological devices and appliances for use in the knowledge creation and transfer processes so as to gain a boost in such processes. Surprisingly, research findings and reports, comments from academic personnel who are involved in knowledge creation and transfer exercises, scholarly positions, students' comments and general observations tend to show that, knowledge management activities of creation and transfer are still conducted through the instrumentalities of traditional mechanisms like crude lesson preparation, arrangement of lecture notes, crude experiments, face to face classroom communication, interactions and dissemination of knowledge through the chalkboard and utilization of textbooks and handouts. These imply that the stakeholders in the knowledge creation and transfer processes may not be making use of the advanced technologies and if they do, the extent may not be significant. Based on this, the researchers decided on conducting an empirical study to determine the extent to which advanced technologies are utilized in the knowledge creation and transfers processed in South-South Nigerian universities.

## **Aim and Objectives of the Study**

The study investigated the utilization of advanced technologies in knowledge creation and transfer in South-South Nigerian universities. In specific terms, the study had the following objectives:

- To ascertain the extent of utilization of advanced technologies in knowledge creation in South-South Nigerian universities.
- To establish the extent of utilization of advanced technologies in knowledge transfer in South-South Nigerian universities.

## **Research Questions**

The following research questions were answered in the study:

- What is the extent of utilization of advanced technologies in knowledge creation in South-South Nigerian universities?
- What is the extent of utilization of advanced technologies in knowledge transfer in South-South Nigerian universities

## Hypotheses

The following hypotheses were tested in the study at 0.05 level of statistical significance:

- **Ho1:** There is no significant difference between the mean ratings of male and female Heads of Departments on the extent of utilization of advanced technologies in knowledge creation in South-South Nigerian universities
- **Ho2:** There is no significant difference between the mean ratings of Acting and Substantive Heads of Departments on the extent of utilization of advanced technologies in knowledge transfer in South-South Nigerian universities.

## METHODOLOGY

The design for the study was the analytical descriptive survey, the population was 7 federal universities in South-South Nigeria and sample was 450 Heads of Departments selected using the census and proportionate stratified random sampling techniques. The instrument of the study was the validated 20-item Extent of Utilization of Advanced Technologies in Knowledge Creation and Transfer Scale (EUATKCTS), designed by the researchers in the modified 4-point Likert scale model of Very High Extent (VHE), High Extent (HE), Low Extent (LE) and Very Low Extent, with a reliability index of .92, obtained using the Cronbach Alpha procedure. Mean and standard deviation were used in answering the research questions while t-test was used in testing the hypotheses at .05 level of statistical significance.

## RESULTS

**Result Question 1:** What is the extent of utilization of advanced technologies in knowledge creation in South-South Nigerian universities?

**Table I:** Mean and Standard Deviation on the Mean Ratings Male and Female Heads of Departments on the Extent of Utilization of Advanced Technologies in Knowledge Creation in South-South Nigerian universities

S/N	ITEMS	MEAN RESPONSES					Remark
		Male Heads of Department		Female Heads of Department		$\bar{x}\bar{x}$	
		$\bar{x}1$	SD1	$\bar{x}2$	SD2		
1	Artificial intelligence are employed in the process of lecture preparation	2.18	0.51	2.12	0.47	2.15	LE
2.	Academic personnel make use of quantum computing in preparation academic materials	2.24	0.55	2.12	0.48	2.18	LE
3.	5 G Expression are made to be part of the knowledge creation process	3.36	0.59	2.61	0.88	2.98	HE

4.	Virtual reality is made use of in the process of knowledge production	3.18	0.38	3.00	0.00	3.09	HE
5.	Augmented reality is used by academic personnel in lecture preparation	3.17	0.38	3.36	0.58	3.27	VHE
6.	Internet of things has been integration into the knowledge creation process in universities	3.12	0.32	2.95	0.42	3.03	VHE
7.	Academic personnel in the field of agriculture make use of biotechnology in knowledge preparation	3.23	0.64	2.95	0.54	3.08	HE
8.	Block chain technology is veritable aspect of knowledge creation in universities	3.18	0.86	3.01	0.34	3.09	HE
9.	Autonomous are made use of in knowledge creation in universities	3.35	0.59	3.01	0.09	3.18	VHE
10.	Edge computing is utilized by academics during knowledge creation	3.11	0.58	3.06	0.23	3.08	HE
		<b>3.01</b>	<b>0.54</b>	<b>2.82</b>	<b>0.45</b>	<b>2.91</b>	<b>HE</b>

Data on Table I present the mean and standard deviation on the mean ratings of male and female Heads of Departments on the extent of utilization of advanced technologies in knowledge creation in South-South Nigerian universities. From the analysis, items 1, 2 and 3 show mean sets between 2.01 and 3.00 (High Extent) while items 4,5,6,7,8,9, and 10 show mean sets between 3.01 and 4.00 (Very High Extent). In summary with an aggregate mean set of 2.91 between 2.01 and 3.00 on the scale of measurement, male and female Heads of Departments responded that, the utilization of advanced technologies in knowledge creation in South-South Nigerian universities is to a high extent.

**Research Question 2:** What is the extent of utilization of advanced technologies in knowledge transfer in South-South Nigerian universities?

**Table 2:** Mean and Standard Deviation on the Mean Ratings of Acting and Substantive Heads of Departments on the Extent of Utilization of Advanced Technologies in Knowledge Transfer in South-South Nigerian universities

S/N	ITEMS	MEAN RESPONSES					Remark
		Acting Heads of Department		Substantive Heads of Departments		$\bar{x}\bar{x}$	
		$\bar{x}1$	SD1	$\bar{x}2$	SD2		
11.	Academic staff make use of machines in the teaching process	3.30	0.71	3.13	0.48	3.22	VHE
12.	Academic personnel make use of immersive reality during their interactions with students	3.15	0.61	3.08	0.45	3.12	VHE
13.	Entreprise Social Network is used in teaching students in universities	3.22	0.74	3.33	0.47	3.28	VHE
14.	Realtime Collaboration Platforms is used in disseminating new knowledge to prospective consumes	3.13	0.60	3.43	0.49	3.28	VHE
15.	Learning management systems are employed in knowledge transfer processes	3.32	0.60	3.29	0.45	3.31	VHE
16.	Knowledge management system are utilized in knowledge transfer exercise in universities	3.19	0.71	3.28	0.45	3.31	VHE
17.	Visual Collaboration Tools are utilized managing knowledge dissemination processes in	3.03	0.50	3.29	0.45	3.16	VHE

18.	universities Wiki Based Software are made use during knowledge transfer activities	3.18	0.76	3.28	0.45	3.23	VHE
19.	Knowledge Base Software are used in the processes of knowledge transfers to deserving clients	3.25	0.66	3.00	0.50	3.13	VHE
20.	Document collaboration tools are used in transferring knowledge that have been in universities	3.35	0.72	3.42	0.49	3.39	VHE
		<b>3.21</b>	<b>0.66</b>	<b>3.25</b>		<b>3.33</b>	<b>VHE</b>

Data on Table 2 present the mean and standard deviation on the mean ratings of Acting and Substantive Heads of Departments on the extent of utilization of advanced technologies in knowledge transfer in South-South Nigerian universities. From the analysis, all the items (11;12,13,14,15,16,17,18,19, and 20) report mean sets between 3.01 and 4.00 (Very High Extent).

In summary, with an aggregate mean set of 3.23 between 3.01 and 4.00, Acting and Substantive Heads of Departments responded that the extent of utilizations of advanced technologies in knowledge transfer in South-South Nigerian universities is to a very high extent.

**Ho1:** There is no significant difference between the mean ratings of male and female Heads of Department on the extents of utilization of advanced technologies in South-South Nigerian universities.

Table 3: Summary of z-test Analysis on the Mean Ratings of Male and Female Heads of Departments on the Extent of Utilization of Advanced Technologies in Knowledge Creation in South-South Nigerian Universities

Variables	N	$\bar{x}$	SD	Df	z-value	Sig. value	Alpha value
Male Heads of Departments	280	3.01	0.54	478	4.32	0.00	0.05
Female Heads of Departments	200	2.82	0.45				

Data on Table 3 present the summary of the z-test analysis of the difference between the mean ratings of male and female Heads of Departments on the extent of utilization of advanced technologies in knowledge creation in South-South Nigerian universities. With the total number of subjects as 480, the z-value calculated and used in testing the hypotheses resulted in 4.32, using 478 degrees of freedom, 0.00 significant value at 0.05 alpha value of significance. At 0.05 level of alpha significance, 0.00 significant value and 478 degrees of freedom, the calculated z-value of 4.32 is rejected because the significant value of 0.00 is less than the alpha value of 0.05. Hence, there is a significant difference between the mean ratings of the respondents. Based on these observations, the researchers rejected the null hypothesis in favour of the alternative that, there is a significant difference between the mean ratings of male and female Heads of Departments on the extent of utilization of advanced technologies in knowledge creation in South-South Nigerian universities.

**Ho2:** There is no significant difference between the mean ratings of Acting and Substantive Heads of Departments on the extent of utilization of advanced technologies in knowledge transfer in South-South Nigerian universities.

Table 4: Summary of z-test Analysis of the Difference between the Mean Ratings of Acting and Substantive Heads of Departments on the Extent of Utilization of Advanced Technologies in Knowledge Transfer in South-South Nigerian universities

Variables	N	$\bar{x}$	SD	df	z-value	Sig. value	Alpha value
Acting Heads of Department	311	3.21	0.66	478	0.91	0.06	0.05
Substantive Heads of Department	169	3.25	0.47				

Data on Table 4 present the summary of z-test analysis of the difference between the mean ratings of Acting and Substantive Heads of Departments on the extent of utilization of advanced technologies in knowledge transfer in South-South Nigerian universities. With the total number of subjects as 480, the z-value calculated and used in testing the hypotheses resulted in 0.91 using 478 degrees of freedom, 0.06 significant value and 0.05 alpha level of significance. At 0.06 significant value, 478 degrees of freedom, the calculated z-value of 0.91 is accepted because the significant value of 0.05. Hence, there is no significant difference between the mean ratings of Acting and Substantive Heads of Departments on the extent of utilization of advanced technologies in knowledge transfer in South-South Nigerian universities.

## DISCUSSION OF FINDINGS AND IMPLICATIONS

### Extent of Utilization of Advanced Technologies in Knowledge Creation in South-South universities

The first finding of the study is that the utilization of advanced technologies in knowledge creation in South-South Nigerian universities is to a high extent. Also, a corresponding finding from the test of hypothesis established that there is a significant difference between the mean ratings of male and female Heads of Departments on the extent of utilization of advanced technologies in knowledge creation in South-South Nigerian universities. These findings are confirmatory of Afangideh (2009). O.W Orgi (Personal Communication, January 05, 2025) and E.S Fomsi (Personal Communication, January 09, 2025). These researchers and scholars have their different research reports and scholarly contribution list the advanced technologies that are in use in organizations among their school, for knowledge creation activities. A possible explanation for the trend in the findings may be in the fact that the respondents of the study as academic personnel have made use of advanced technologies in their knowledge creation activities and others involvements and can therefore vouch for and give accurate information on the extent of utilization of advanced technologies in knowledge creation. These finding imply that universities in South-South Nigeria have responded positively to international requirements that advanced technologies be used in knowledge creation in higher education.

### Extent of Utilization of Advanced Technologies in Knowledge Transfer in South-South Nigerian Universities

The second finding of the study is that the utilization of advanced technologies in knowledge transfer in South-South Nigeria is to a very high extent. This finding agrees with Afangideh (2009), U.W. Orji (Personal Communication, January 06, 2025) Afangideh and Nwideduh (2010), N.M. Abraham (Personal Communication, January 06, 2025). These researchers and



scholars have in their various research efforts and scholarly contribution identified the advanced technologies that are utilized in organization, among their schools. A possible backing for the trend in the finding may be in the fact that the respondents, as academic staff and academic staff administrators have been involved in utilization of advanced technologies in knowledge transfers in their universities and can attest to their extent of usage.

However, surprisingly, a corresponding finding from test of hypotheses, established no significant difference between the mean ratings of Acting and Substantive Heads of Departments on the extent of utilization of advanced technologies in knowledge transfer in South-South Nigerian universities. Also, this latter finding disagrees with Afangideh (2009), U.W. Orji (Personal Communication, January 05, 2025, Afangideh and Nwideduh (2010) and N.M. Abraham (Personal Communication, January 06, 2025), it cannot invalidate the fact that advanced technologies are used in knowledge transfer exercises. The difference in the finding may have resulted from status perception on the part of Acting and Substantive Heads of Departments or the rigorous statistics employed in data analysis which looked for significant difference. These findings imply that South-South Nigerian universities have fully embraced the use of advanced technologies in knowledge transfers.

## **CONCLUSION**

Based on the finding of their study and their educational management implications, it is concluded that South-South Nigerian universities are in frontline of those universities who make use of advanced technologies in knowledge creation and transfer although the extent of utilization is considered significant for knowledge creation and not significant for knowledge transfer.

## **Recommendations**

Based on the findings and conclusion of the study, it is recommended as follows:

- Stakeholders in knowledge creation in universities should continue to make provision for and encourage the continuous utilization of advanced technologies in knowledge creation.
- There is need for connected efforts among knowledge transfer stakeholders and participants to continue to ensure continuing utilization of advanced technologies in knowledge transfer while also ensuring that issues of differences are resolved for the sake of the knowledge economy.

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