Perception of Information and Communication Technology Utilization by Basic Science and Technology Teachers in Karu, Nasarawa State

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Abstract
The paper investigated the perception of Information and Communication Technology utilization by Basic Science and Technology teachers in Karu, Nasarawa State. The study sample consisted of 105 Basic Science and Technology teachers purposefully selected from public owned middle and upper basic education schools in Karu, Nasarawa State. A researcher-designed instrument titled "Questionnaire on Basic Science and Technology and Information and Communication Technology Utilization (QBSTICTU)" was used for data collection. The instrument was validated by experts and reliability coefficient of 0.73 was obtained using Cronbach Alpha. Four research questions were answered and two hypotheses were tested at 0.05 alpha level of significance. Data collected were analyzed using mean and standard deviation for the research questions and t-test for the hypotheses. Findings show that Basic Science and Technology teachers expressed high (positive) perception of ICT utilization by recognizing its variegated usefulness, also highly aware of assorted nature of the impediments to the utilization of ICT tools and applications and their remedy. No statistically significant difference on gender, but a significant difference in perception of ICT utilization was found when varying levels of ICT training and professional development are brought to focus. Among the recommendations made include: development of a clear ICT integration plan into the curriculum and across schools, provision of adequate ICT infrastructure, resources and power supply, regular ongoing professional development opportunities for teachers and supportive school culture.

Keywords: Perception, Utilization, Information and Communication Technology, Basic science and Technology, Teachers

Introduction

Information and Communication Technology (ICT) have become an integral part of the global system today finding utilization in different spheres of human endeavours; also, widening daily in spectrum. Rouse (2023) affirmed that ICT is driving innovation and competitiveness, fostering global connectivity and enhancing productivity in modern society worldwide. Its aspiration is to sustain, retain, maintain and enhance access to information and; also enable easier and more efficient human- to -human, human to machine and machine to machine communication and interaction. The educational system of the world is not left out in the drastic transformation brought about by ICT as it offers variegated innovative applications and diverse unquantifiable benefits. The essence of ICT in bridging the digital gap and as a powerful tool for economic and socio-cultural transformation of the world particularly with the education sector cannot be over-emphasized (Ezeanyi & Anaekwe, 2021). Students, teachers, administrators, policy makers, curriculum formulators, governmental and non-governmental institutions around the world as well as other stake-holders in the education sector utilize ICT in their operational modes and at differnet levels.

Goal-4 target of the United Nations' Sustainable Development Goals (SDGs) stipulates the inclusive and harmonious distribution of quality education in addition to the promotion of life-long learning for all (United Nations Educational and Scientific Organization /UNESCO, 2021). This goal is targeted at reducing disparities and inequities in education, both in terms of access and in terms of quality (United Nations' International Children's Emergency Fund/ UNICEF, 2024). If conscientiously pursued, the utilization of ICT in teaching- learning might facilitate the realization of the SDG - 4 target particularly as it concerns the sub- Saharan Africa.

Information and Communication Technology is described by Johnson et al.'s (2021) as conglomeration of computer- based tools used by the populace to facilitate the information and communication processing systems of an organization. It precludes but not restricted to computer hardwares and softwares, the network system, and several other digital and non-digital devices (e.g. video, audio, photography, cellular phones, camera, scanners, printers, social- wireless networking and internet connections, media applications and services.etc) that can convert information (text, images, sound, motion) into common digital form. It is defined by Tapera and Kujeke (2019) as a type of technology that enhances activities involving information gathering,

information processing, information storing, data presentation and data recording/ keeping. For example, ICT can be used to store information about students/financial records and transactions in a school system; and carry out teaching- learning activities. UNESCO (2017) referred to ICT as a different arrangement of technological resources and tools used in transmitting, storing, creating, sharing or exchanging information. Among others, the technological resources and tools include computers, live broadcasting technologies, internet and telephony.

Integrating ICT in education is an effective policy that can be actualized through all- round school-based planning, teacher training/ retraining and professional development. Access to instructional resources and method/ process of instruction have changed drastically particularly in the advanced nations of the world. Ezeanyi and Anaekwe (2021) affirmed that online packages of different configuration abound today which give teachers and students greater control over teaching-learning contents, pedagogy and knowledge of technology. Students now engage with knowledge in an active, self-directed and constructive manner as they are also being prepared for the digital future. Scientific experiments and simulations can easily be carried out on the screen with greater interactions across geographical locations. It is further highlighted by UNESCO (2021) the challenge being experienced which among others include that of developing ICT competency standards for teachers to integrate in their pedagogy, that of offering continuous support and that of providing teachers with incentives and professional motivation needed to unlock ICT potential with a view to enhancing quality teaching -learning. It is recommended by UNESCO (2017) in the Qingdao statement of the need to integrate the evaluation of the use of ICT into the systems and practices of institutions and teachers' body for monitoring the quality of teaching- learning.

The interactive effect of gender is a moderating variable being considered in the teachers' utilization of ICT in the teaching -learning of Basic science and Technology. Issues bothering on gender equity, gender stereotype, gender sensitivity and related subject matter have become a recurring critical theme among educators especially in science and technology fields, and then the society at large (Agu & Isei, 2018; Ezeanyi & Anaekwe, 2021). Previous studies have reported that more males than females utilize ICT in delivering instruction on scientific concepts and processes. Few others have reported that gender has no significant interactive effect on teachers' utilization of ICT in teaching- learning of scientific concept.

Concerning the teaching- learning of Basic science and Technology as a subject in Nigerian primary and junior secondary schools, the Nigerian Educational Research and Development Council/ NERDC (2012) has developed a revised curriculum content for the subject written in a clear unambiguous term and meant to meet the targets of the nine- year basic education. Among the recommendations include greater learning experiences which would engender the impartation of functional, practical and relevant entrepreneurial and life- survival skills meant for creativity, self- reliance and productivity all aimed at reducing poverty and ensuring inclusivity (Obioma et al., 2014). Instructional approaches recommended in the curriculum include activity- based learning, pictorial organizers, and cooperative learning capable of achieving the three main objectives of educational taxonomy – cognitive, affective and psychomotor. Recall, also that the National Policy in Education, Federal Republic of Nigeria/FRN (2014) stipulates that education is an 'instrument per excellence' for achievement of national development and self' realization/ survival of the citizenry.

However, the implementation of the Basic science and Technology curriculum over the years has been faulted in some key aspects. Notable among the weaknesses pointed out include: poor linkage of the curriculum content to the immediate environment, inadequacy of functional (standard) laboratories for proper implementation of the curriculum, teaching theoretically with little or no demonstration of practical activity and; very low use of guided discovery teaching approach and over-use of the conventional teaching approaches (Afolabi, 2020). Students become passive learners and unable to make good use of their own initiatives. One of the pitfalls as observed by Agu and Isei (2018) is the failure of learners to conceptualize learning experiences on scientific concepts and processes. The resultant effect is the inability of basic education graduates to harness their critical thinking skills and translate organized- based knowledge structure to functional learning experience that can be applied in solving common societal problems (Bowale & Ogundipe, 2022).

Another dire consequence is high failure rate in public examinations as it concerns Basic science and Technology. Each state of the Nigerian federation has the State Educational Resource Centre/ Service which handles the Basic Education Certificate Examinations (BECEs) at that level and used for different purposes particularly for placement into Senior Secondary One class. At the Federal level, the National Examinations Council (NECO) also organizes BECEs for Federal Unity

Schools and Some Private Schools accredited to host such examinations. These weaknesses and lack of self- efficacy in comprehending and applying scientific concepts and processes often manifest during the senior secondary school years when the students have been mainstreamed into the different compartments of science (e.g. Physics, Chemistry, Biology, Technical Drawing, Installation works etc.). Ideally, the experiences presumed to have been gotten at the upper basic education (i.e. junior secondary school) level should lay the foundation and be veritable to the learners as they advance to the senior secondary school where they are expected to study science at a higher level of complexity for ones who choose science- based subjects as their core (Afuwape & Oriola, 2017).

Educators have blamed the scourge of failure highlighted on the teaching methodologies being used which are mostly traditional and didactic in nature making learners passive recipients of knowledge (Afuwape and Olugbuyi, 2019). The conscientious incorporation of information and communication technology might likely enhance these recommended problem- solving, learner- centred, experiential learning with feedback and activity packaged approaches. Thus, the thrust of the study is to determine the utilization of ICT in the teaching- learning of Basic science and Technology in Karu Local Government Area, Nasarawa State.

Research Questions

The following underlisted research questions were formulated to guide the study:

1. What is the perception of Basic Science and Technology (BST) teachers towards the utilization of ICT in public schools in Karu, Nasarawa State?

2. What is the BST teachers' perception of challenges faced in the utilization of ICT in their teaching practice in Karu, Nasarawa State?

3. What impact has level of training on the BST teachers' perception of strategies to improve the integration of ICT in public schools in Karu of Nasarawa State?

Hypotheses

The following hypotheses are tested at 0.05 level of significance.

Ho_1: There is no significant difference in the perceptions of ICT utilization by Basic science and Technology teachers in public schools based on level of training in Karu, Nasarawa.

Ho_2: There is no significant difference in the perception of ICT utilization among Basic science and Technology teachers in public schools in Karu of Nasarawa State based on their gender.

Methodology

A descriptive cross- sectional survey was adopted as research type for the study. The population of the study consisted of about 300 Basic science and Technology teachers in public (middle Basic and upper Basic Education) schools in Nasarawa State. The sample size for the study was 105 Basic science and Technology teachers chosen through purposive sampling technique from Karu, Nasarawa. A 30-item, 4- point Likert rating scale structured questionnaire items of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) used to score the responses, ranked 4, 3, 2 and 1 respectively was the main instrument for data collection. It was entitled 'Questionnaire on Perception of Basic science and Technology Teachers towards Information and Communication Technology Utilization (QPBSTITU). The questionnaire items were arranged in four clusters based on the research questions and addressed specific purpose of the study. The instruments were validated by Lecturers in Department of Science, Technology and Mathematics Education of Nasarawa State University, Keffi. QPBSTITU was subjected to a pilot- test. It was administered to a sample of BST teachers in Nasarawa State who are part of the population but not part of the study sample. Coefficient of internal consistency was estimated at 0.73 using Cronbach alpha technique. Research assistants were engaged and helped to administer the questionnaire items to the respondents. The questionnaire was administered by the wait- and – take mode. Respondents had to tick the option (box) that best suit their thought for each of the item. The scripts were collected and graded accordingly. The data collected were analyzed using mean and standard deviation for the research questions and t- test used to test the hypotheses at 0.05 alpha level of significance. A mean of 3.00 was set as a criterion level of acceptance.

Results

Research Question 1: What is the perception of Basic science and Technology teachers towards the utilization of ICT in public schools in Karu of Nasarawa State?

Table 1: Shows the perception of ICT utilization by BST teachers in public schools in Karu, Nasarawa

Probable Challenge	SA	A	D	SD	Mean	STD	Decision
Enhances students' engagement with Concepts/processes in the classroom	56	44	5	0	3.49	0.58	Positive
Fosters critical thinking and problem-solving skills in students	22	68	10	5	3.02	0.71	Positive
Improves students' learning outcomes	80	25	0	0	3.76	0.43	Positive
Personalizes learning experiences for Students	73	22	8	2	3.58	0.71	
Facilitates collaboration and communication among students	25	73	6	1	3.16	0.68	Positive
Inculcates creativity and innovation in students	60	40	4	1	3.51	0.62	Positive
Improves access to educational resources and information	75	30	0	0	3.76	0.39	Positive
Motivates and inspires students to learn	90	15	0	0	3.86	0.35	Positive
Enhances students' retention and understanding of concepts	83	20	2	3	3.77	0.46	Positive
Promotes students' autonomy and self-directed learning	38	60	6	1	3.29	0.61	Positive

Cluster Mean 3.52. STD. 0.56 = 0.6

From the Table 1, item 1, BST teachers perceived that ICT enhances students' engagement with concepts/ processes in the classroom with a mean of 3.49 and standard deviation of 0.58. Item number 2 which states that "ICT fosters critical thinking and problem-solving skills in students" has a mean of 3.02 and a standard deviation of 0.71. A mean of 3.76 and a standard deviation of 0.43 for BST teachers who perceived ICT that it "Improves students' learning outcomes" while a mean of 3.58 and a standard deviation of 0.71 for teachers who believe that ICT "Personalizes learning experiences for students. "Number 8 which states that ICT "motivates and inspires students to learn" has the highest mean of 3.86. The cluster mean is 3.52 which is above the

criterion set mean while the Standard deviation is 0.56. The criterion level of acceptance for the mean is set at 3.00. This indicates that the perception of BST teachers was positive.

Research Question 2: What is the BST teachers' perception of the perceived challenges faced in the utilization of ICT in their teaching practice in Karu of Nasarawa State?

Table 2: The perceived challenges faced by BST teachers in using ICT in Karu, Nasarawa

Probable Challenge	SA	A	D	SD	Mean	STD	Rank	Decision
Lack of technical support	35	60	7	3	3.21	0.61	7th	Accepted
Insufficient time to prepare ICT-based instructional materials	40	40	8	2	3.27	0.68	5th	Accepted
Lack of internet connectivity in the schools	80	20	5	0	3.71	0.55	1st	Accepted
Insufficient training in ICT tools and applications	65	20	12	8	3.35	0.96	4th	Accepted
Compatibility issues between ICT devices and Software	20	30	50	5	2.62	0.84	10th	Rejected
Unavailability of computer laboratory/computer facilities/IT infrastructure	40	55	5	5	3.24	0.84	6th	Accepted
Lack or shortage of computer systems needed by students and teachers in the classroom	35	60	7	3	3.21	0.69	7th	Accepted
Erratic electric power supply in schools	60	40	4	1	3.51	0.62	3rd	Accepted
Teachers' lack of interest in the use of ICT in classroom situation	20	73	7	5	3.03	0.67	9th	Accepted
Limited financial resources for acquiring & maintaining ICT resources	66	32	5	2	3.54	0.68	2nd	Accepted

Table 2 showed the results of ranked mean on each item of probable challenge on the use of ICT as perceived by BST teachers. Number 3 which state that "lack of internet connectivity" was ranked first (1st) with a mean score of 3.71 and standard deviation of 0.55. Number 10 which states that "Limited financial resources for acquiring and maintaining ICT" was ranked second (2nd) with a mean score of 3.54 and a standard deviation of 0.68. Number 8 and 4 which state that "Erratic electric power supply in the schools" and "Insufficient training in ICT tools and application" were ranked third (3rd) and forth (4th) respectively. Number 2 which states that "Insufficient time to

prepare ICT- based instructional materials" was ranked 5th with a mean of 3.27 and a standard deviation of 0.68. The compatibility issues between ICT devices and software were the only item rejected as one of the main challenges faced by BST teachers in the use of ICT as it is below the set mean of 3.00 and ranked 10th on the table.

Research Question 3: What impact has level of training on the perception of ICT teachers of the strategies to improve the integration of ICT in public schools in Karu, Nasareawa?

Table 3: The mean and standard deviation of varying levels of ICT training relative to the strategies as perceived by Basic Science and Technology teachers in public schools

Items	**SA**	A	D	SD	Mean	STD	**SA**	A	D	SD	Mean	STD
Have received sufficient training to effectively use ICT in my teaching	0	0	65	20	1.76	0.23	10	10	0	0	3.50	0.50
Feel confident in ability to integrate ICT into my teaching	2	13	55	15	2.02	0.65	8	12	0	0	3.40	0.49
Continuing professional development is necessary to enhance ICT utilization.	28	47	10	0	3.21	0.63	12	8	0	0	3.60	0.49
Teacher training programs adequately prepare teachers to use ICT in the classrooms	5	52	28	0	2.73	0.56	10	8	2	0	3.40	0.66
Collaboration and sharing of best practices among teachers can improve ICT utilization in schools	20	60	5	0	3.18	0.51	10	7	3	0	3.35	0.73
Receive regular updates and training on new ICT tools and applications	0	17	58	10	2.08	0.56	10	8	2	0	3.40	0.66
Have access to professional development opportunities related to ICT integration	1	3	73	8	1.96	0.42	6	12	2	0	3.20	0.60
Receive support and guidance from instructional technology specialists	0	0	70	15	1.82	0.38	5	5	10	0	2.27	0.83
Actively search out new ICT resources and strategies for teaching	4	59	20	2	2.76	0.57	14	6	0	0	3.70	0.46
Collaborate with other teachers to share ICT	4	20	51	10	2.21	0.70	6	10	4	0	3.10	0.70

integration ideas and experience	
Limited training (N=85, 80.9% of 105)	Extensive training (N=20, 19.05%)
Cluster Mean = 2.37 STD = 0.52	Mean= 3.30 STD= 0.56

Based on level of ICT training, Table 3 shows that more respondents have limited training, about 85 (80.95%) as compared to respondents who have extensive training, about 20 (19.05%). The researchers employed open- ended questions to gather the data on the strategies identified by the BST teachers. The cluster mean for BST teachers with limited training is 2.37 with standard deviation of 0.52 while that of the teachers with extensive training is 3.30 with standard deviation of 0.56 when their perception of strategies to improve the integration of ICT is ascertained empirically.

$H0_1$: There is no significant difference in the perceptions of ICT utilization by BST teachers in public schools based on level of training.

Table 4: T-test Analysis of varying level of ICT Utilization of BST teachers based on training

Variables	N	Mean	STD	DF	T- Value	Critical Value	Decision
Limited training	85	2.37	0.52				
				103	2.14	1.98	Ho rejected
Extensive training	20	3.30	0.56				

P≥ 0.05

The result of the hypothesis 1 in Table 4 showed the mean responses of BST teachers who have limited training and those who have extensive training in ICT using t- test statistic. The calculated t-value 2.14 was obtained with critical value, 1.98 at a significant level of 0.05. From the analysis, the t-value of 2.14 is greater than the critical value of 1.98 in absolute terms at a 0.05 level of significance.

$H0_2$: There is no significant difference in the perception of ICT utilization among BST teachers in public schools in Karu of Nasarawa based on gender.

Table 5: T- test Analysis of gender of BST teachers' perception of ICT in public schools

Variables	N	Mean	STD	DF	T- Value	Critical Value	Decision
Male	72	3.54	0.53				
				103	0.73	1.98	Ho accepted
Female	33	3.46	0.55				

P≥ 0.05

The result of the hypothesis 2 in table 5 showed the mean responses of male and female BST teachers in Karu. The calculated t- value 0.73 was obtained with the critical value, 1.98 at a significant level of 0.05. From the analysis, the t-value of 0.73 is less than the critical value of 1.98. This means that the t-value did not exceed the critical value, indicating that the difference or relationship being tested is not statistically significant at the 0.05 level of significance.

Discussion of Findings

Based on the results of the data analysed in Table 1, 2 and 3 relative to the research questions raised to guide the study, Basic science and Technology teachers in Karu, Nasarawa State expressed high perception of ICT utilization, recognizing its potential benefits to enhance teaching effectiveness, student's engagement and access to educational resources and information. BST teachers perceived ICT as a tool to foster creativity and promote collaboration among students. The teachers believed ICT utilization among others motivates and inspires students to learn and conceptualize concepts, improves learning outcomes and personalizes learning experience. The results of data analyzed for BST teachers' perception of the perceived challenges to ICT utilization show that BST teachers have good perception of the several challenges including the lack of technical support, insufficient training in ICT tools and application, erratic power supply, among others. Indeed, there are schools in villages that are neither connected to the national grid nor have access to alternative power supply. The challenge of Internet connectivity is prominent among other identified challenges faced by BST teachers in ICT utilization. From results of hypotheses tested in table 5 and since the t-value falls in the critical region beyond the critical value, the null hypothesis is rejected at the 0.05 level of significance with the inference that there is a significant difference in the perception of ICT utilization between BST teachers with varying levels of ICT training and professional development. The results show that BST teachers with limited training have low perception of the strategies to improve ICT utilization in public schools in Karu while the few with extensive training have high perception of the strategies to improve ICT utilization.

Results obtained from Table 5 show that the null hypothesis is not rejected inferring therefore that there is no statistically significant difference in the perception of ICT utilization among BST teachers in public schools in Karu, Nasarawa based on gender.

If Basic science and Technology teachers have relatively high perception of the benefits and challenges of utilizing Information and Communication Technology in teaching, it connotes that there could be other tangential factors that need to be addressed to ensure effective teaching-learning in schools; and eventually bring about an improved outcome for BST students and pupils. If these underlying factors are addressed, basic education graduates will most likely be ready to take up pure science courses at the senior secondary school level and subsequently pursue future career opportunities in science, technology, robotics, engineering, arts and mathematics (STREAM) as the case may be. The problem of inadequacy of ICT infrastructure (facilities, tools, devices and internet connectivity etc.) and erratic power supply were brought to limelight. The political will to invest in ICT (acquire, install and maintain) infrastructure that will facilitate the utilization of ICT in teaching need to be imbibed by public office holders in Nigeria. Also, if the teachers are not grounded in the needed technological and digital skills, there cannot be meaningful teaching- learning. This implies that BST teachers with limited training in ICT would have difficulty integrating ICT in their teaching process while the ones that have indept knowledge find it easy. The goal- 4 target of the United Nations' Sustainable Development Goals of quality education for all alongside lifelong learning will become a mirage; more so, considering the dispensation of the technologically and information driven world of today. It shows the urgent need for ongoing training and professional development for teachers at the Basic education level. The curriculum of teacher- training institutions could be overhauled to include the training of teachers on ICT utilization. The study also suggest that gender has little or no influence on the perception of BST teachers towards the utilization of ICT, thereby dispelling some notions being nurtured in some quarters that the female folks are less ICT compliance than their male counterparts or vice versa.

The finding agrees with the reports revealed by Bakare and Owadara (2022) that teachers of Basic science in Osun State have positive perception towards the use of ICT resources in teaching-learning of Basic science; and that ICT would aid students' level of assimilation of scientific concepts. The findings of this study also tally with that of Kazmi and Mohammad (2023) who revealed that most of the science teachers were found very optimistic in the use of ICT while

teaching. Bayuo et al.'s (2022) in their study found that science teachers are competent in using ICT tools in performing teaching and learning, nevertheless pointed out that ICT has not been most effectively utilized in teaching Chemistry due to some of the factors as identified in this work, also observing that the general usage of ICT by teachers was low. The problem associated with lack of adequate ICT infrastructure, scarcity of technical know-how on the procedure to manipulate digital devices in teaching- learning and poor utilization of ICT tools by science teachers in Nigeria appear widespread in scope. Bayuo et al (2022) had grouped these challenging factors into: teacher- level factors, technological- related factors, cost- related factors, environmental- related factors and management and leadership- related factors.

Furthermore, the findings of this study corroborate that of Onwunara (2020) who identified impediment to ICT use in teaching – learning of Basic science and Technology to include: poor power supply, poor maintenance of available ICT facilities, high cost of ICT tools, poor digital/ technological skill and negative attitude towards ICT tools/ devices by some teachers. The finding is in agreement with the reports by Kazmi and Mohammad (2023) and Johnson et al.'s (2021) that even though many teachers have undergone either introductory or equipment- specific training, only very few of them have received training in advanced courses on internet use (e.g. creating websites and video- conferencing etc.). It was reported that the available ICT resources are under-utilized due to the lack of competence by teachers to operate ICT facilities. This finding can also be seen in the reports of Tapera and Kujeke (2019) who affirmed that if Chemistry teachers stay abreast of emerging technologies and trends in educational technology through professional development opportunities, conferences, and online resources, exploring new tools and approaches for ICT integration would be easy. Though, the finding of Adenubi et al.'s (2024) identified ICT as a vehicle to improve performance, emphasis was on the government and public service.

Likewise, the perceived challenge of limited access to computers, internet connectivity, software, multi-media facilities, technical support, training, and time constraints identified in this study are in tandem with findings of Bakare and Owadara (2022). Ongoing professional development opportunities should be made accessible to teachers and a dedicated technical support team or helpdesk to assist in resolving technical issues related to ICT be made readily available. The curriculum could be aligned with goals and guidelines that incorporate the use of ICT tools across different subjects. The work of Ezeanyi and Anaekwe (2021) also found no significant difference

in the perception of male and female teachers on the integration of ICT skills among Mathematics teachers in Anambra.

Conclusion

The conclusion is drawn based on the findings of the study which was guided by four research questions and two hypotheses. The findings have provided useful information on the perception of ICT utilization by Basic science and Technology teachers in Karu, Nasarawa. There is need for governments and concerned stakeholders in Nigerian educational system to establish functional institutional framework to support, fund, and procure ICT facilities for use in public schools. Furthermore, teachers' training colleges, institutions, and education boards are to redesign the teacher training curriculum to promote teachers' knowledge, skills, and competence in the utilization of ICT.

Recommendations

From the findings of this study, the following recommendations were made:

1. Create a comprehensive plan that outlines the goals, strategies, and time-line for integrating ICT into teaching- learning across schools. This plan should be aligned with the school's overall vision and objectives.

2. Ensure that schools have sufficient ICT infrastructure and resources, including computers, internet connectivity, software, and multimedia equipment. Regularly update and maintain these resources to support effective ICT utilization.

3. Inculcate regular and targeted continuing professional development opportunities for teachers to enhance their ICT skills, pedagogical knowledge, and digital literacy. These opportunities can include workshops, courses, online resources, and collaboration with other educators.

4. Create a positive, supportive school setting where teachers feel encouraged to experiment with ICT alongside other support services and resources. Recognize and celebrate innovative ICT practices among teachers within the environment.

5. Embed ICT into the curriculum by designing learning experiences that actively incorporate digital devices and resources. Ensure that ICT skills and competencies are explicitly addressed in subject-specific learning outcomes.

6. Foster collaboration among teachers, subjects' departments, and grade levels to share best practices, resources, and lesson ideas for ICT utilization. Establish platforms for sharing and collaboration, such as online communities or teacher networks.

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