

Integration of ICT in the Teaching - Learning Process in Secondary and University Levels of Education

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Introduction

The invention of Information and Communication Technology (ICT) has been one of the greatest innovations known to mankind especially in the field of education. It has the ability to enhance the effectiveness of the teaching and learning process to a great extent. The review of related literature educates the researcher with a comprehensive understanding on studies correlated with ICT, its utilization and problems in its integration. Various studies on pedagogy revealed that the use of educational tools and multimedia has had a positive impact on performance and enhanced retention of the students. The utilization of these tools and resources grasps the students' attention and keep them engaged in the classroom. Instructional materials cater to the individual differences of the students, helping them learn visually, kinesthetically, through audio, video, pictorial representation etc. At the same time, we need to take into practical considerations the various limitations existing in incorporating ICT at school level. The issues pertaining to the lack of proper infrastructure, unavailability of resources and lack of financial support has been the major contributors of the failure in integration of ICT in school and university levels.

ICT Process in University Level

Akinde. T. A. (2020) studied on “Use of Instructional Technologies in Library and Information Science Schools in Nigerian Universities: Raising the Bar in Pedagogical Content Delivery”. The researcher tried to explore the general perception towards the integration of instructional technologies and the ease of use of these technologies in Library and Information Science schools. The study also aimed at determining the level of integration of instructional technologies and its usefulness in the teaching-learning process in Library and Information Science schools and to study the level of support of these technologies in Nigerian universities. A descriptive survey method was adopted for data collection with a sample size of 293 professors in 27 universities in Nigeria. The researcher made a questionnaire entitled as “Library and Information Science School Instructional Support Survey (LISSISS)”. The researcher was used this questionnaire for data collection. The questionnaire was divided into five sub sections viz., Use of Instructional Technologies in LIS (UIT), Feeling towards Use of Technology for teaching (FUT), Perceived Ease of Use of Instructional Technologies (PEUIT), Perceived Usefulness of Instructional Technologies (PUIT), and Instructional Support for Use of Instructional Technologies (ISUIT). Descriptive statistics was used to analyze the collected data namely percentages, frequency distribution, mean and standard deviation.

The findings of the study indicated a low level of integration and use of instructional technologies in the universities in Nigeria. The professors had a positive attitude towards the use of instructional technologies in the teaching-learning process which could have been a result of their positive attitude towards the use of ICT in other areas of their lives. The result of the analysis also suggested a positive attitude towards the ease of use and the educators found it easy to integrate ICT in their day to day life; however, they had a negative attitude towards its usefulness in the teaching-learning process, which could have been the reason for low integration of instructional technologies in the classrooms. The study also identified a low level support to the use of instructional technologies by the administration in Nigerian Universities. The study further suggested that universities should encourage the educators to use instructional technologies in the teaching-learning process to enhance the pedagogical method in the universities, training should be provided to the educators to equip them with the necessary knowledge about ICT integration in classrooms, seminars and conferences on the usefulness of instructional technologies

in the classroom should be conducted to encourage positive attitude towards ICT integration in the educational domain, and the management should support, encourage and sponsor the educators study visits and tours.

Ishaq. K, Zin. N. A. M, Rosdi. F, Abid. A, and Mustansar. I. (2020) carried out a study on “The Impact of ICT on Students’ Academic Performance in Public Private Sector Universities of Pakistan”. The study aimed at finding out the accessibility of ICT facilities at the university and at home. The study also tried to find out the rate of ICT usage by the students, the reason why they use it and to identify the correlation between the academic performance of the students and use of ICT. The sample of the study consisted of 302 students from five different universities in Lahore district. The researcher made 3-point Likert scale questionnaire which was subdivided into four blocks was administered. For analysis of the collected data, t-test, ANOVA and linear regression were used. The findings of the study implied that students had adequate exposure to ICT tools both at home and at the university. Most of the student assert that they use ICT for various tasks namely for preparing assignments, planning lessons and to complete classroom activities efficiently.

The important findings of the study also pointed out that the usage of ICT enhances competencies of the students and improves computer based knowledge which further help in improving organizational behavior in practical field. Furthermore, effective integration of ICT in the teaching-learning process helps in encouraging the students, making the lesson interesting and motivation which in turn helps the students in processing information in an improved manner increasing their understanding and better retention. The study also provided few recommendations for educational institutions such as the administration and faculties should be trained to use ICT to become ICT integration as a part of lesson plans and ICT centers to be established and made available to the students at all levels.

Stosic. L, Dermendzhieva. S. and Tomczyk. L (2020) had undertaken a study on “Information and Communication Technologies as a source of Education”. The study intended to examine students’ attitude towards using ICT as a source of education. The sample of the study consisted of 175 students from Serbia and Bulgaria selected by using simple random sampling technique. The study employed a researcher made 5-point scale questionnaire with 45 items addressing the objectives of the study. Descriptive statistics such as mean, standard deviation were used for data analysis along with t-test and ANOVA.

The major findings of the study revealed that a high degree of similarity among the respondents regarding their attitude towards ICT integration in education and stated that the implementation of ICT in higher education brings about enhanced teaching-learning process. It was also stated that not only does learning with ICT improves the quality of learning but it also equips the students with computer literacy; as a result, the students established that colleges and faculties should be well trained and equipped technically and that ICT integration should be an integral part of the instructional process. It was also established from the findings that ICT integration provides the students with the independence to learn on their own pace, provides flexibility and share knowledge with the rest of the students with ease.

Attinpuluk. H, Kilinc. H, Firat. M and Yumurtaci. O. (2019) observed a study on “The Influence of Segmented and Complete Educational Videos on the Cognitive Load, Satisfaction, Engagement and Academic Achievement Levels of Learners”. Researchers tried to compare the satisfaction levels, cognitive load, performance and engagement levels of open and distance learners on the basis of modular presentations and educational videos divided into small, however, meaningful segments. The study adopted an experimental post-test control group design with 214 participants from the university. The videos were divided into 11 small segments and were analyzed using parametric tests namely t-test and ANOVA, and video analytics.

The findings of the study reported that the division of educational videos into small segments reduced the cognitive loads of the learners and enhanced engagement in the learning process. It was found out that the use of small segment videos in distance courses increased the satisfaction level of the learners resulting in increased academic performance of the learners. The findings of the study also provided a better understanding for open and distance universities on how to develop and produce content modules. The study further suggested that such universities should use meaningful segmented videos that are interactive and flexible, since they motivate the students.

Sebbah. L. (2019) made an empirical study on “Impact of the Flipped Learning Model on first year Algerian EFL degree students’ reading ability: A blended learning approach”. The objectives of the study included to explore the extent to which Flipped Learning Model develops students’ reading ability and how the students perceive the particular model. The study adopted a quasi-experimental design with 100 participants from second semester degree students in Department of English,

University of Algiers. The participants were divided into two groups with each 50 assigned to experimental and control group respectively. The study employed a standardized TOEFL reading test based on multiple-choice questions with 50 items divided into five reading texts, and a researcher made questionnaire with 32 items to explore the students' perception on flipped classrooms. The study followed a pre-test post-test design for the reading test and the data were analyzed using descriptive and inferential statistics. The data from the questionnaire was analyzed using frequency analysis.

The actual findings of the study reported that flipped learning has a significant impact on the reading ability of the students in the experimental group. It was also supported from the results of the questionnaire that students in the experimental group had a positive perception towards flipped learning claiming that it encouraged learning and interaction in one's pace, flexible, autonomy and enhanced communication and provided assistance in the learning process. The combination of online and traditional face-to-face teaching has proven to have a direct impact on developing reading skills and increased learning outcome.

Basri. W.S., Alandejani. J.A. and Almadani. F.M. (2018) investigated about "ICT Adoption Impact on Students' Academic Performance: Evidence from Saudi Universities". The study had intended to evaluate the degree to which universities have implemented ICT, to find out the relationship between ICT integration and students' performance in the university, and to determine the impact of ICT integration in the universities. The sample of the study consisted of 1000 student participants from 4 different universities in Saudi Arabia with 250 students representing each university. The participants were categorized into two groups on the basis of their gender. Purposive sampling technique was employed for sample selection. A researcher-made questionnaire was used as the tool of the study. For analysis of the collected data, Structural Equation Modeling (SEM) which consists of various traditional multivariate statistics such as factor analysis, regression analysis, path analysis, canonical correlation and discriminant analysis, was carried out in AMOS-SPSS software.

The findings related with the above objectives of the study concluded that ICT integration has a positive impact on the academic performance of the students in the universities and also claimed that adoption of ICT in the teaching-learning process enhances the quality of learning outcomes. While comparing the learning outcomes, it

was observed that ICT implementation is more likely to enhance the performance of girl students rather than the boys. A major finding of this study is that there is a high correlation between the GPA of the students and implementation of ICT in classrooms, as the academic performance of the students' increases.

Hadiya Habib (2017) investigated about "The Role of ICT in Higher Education". The study tried to find out how ICT plays major role in supporting the teaching-learning process in the present time. It also tried to investigate the proper integration and implementation of ICT in the curriculum of higher education can motivate the learners to perform better; furthermore, it made the classroom teaching more collaborative and dynamic. This renews the teacher's interest resulting in incorporation of various teaching techniques rather than confining only to the traditional methods of teaching.

The study reported that the significance of ICT has substantially increases over the recent years and is estimated to show more growth in the years to come. It has been emphasized that the integration of ICT has brought in a blend of traditional methods of teaching and technology in the educational domain which has benefitted both the instructors and the learners. It also provides access to abundant information by means of numerous information resources along with multiple perspectives of viewing the information, hence encouraging the authenticity of the learning environment. Thus, ICT functions as a facilitator of active learning and higher-order thinking.

Makewa., et al (2014) observed a study on "ICT Integration in Higher Education and Student Behavioral Change: Observations at University of Arusha, Tanzania". The study intended to evaluate ICT based instruction and changes in students' behavior at the University. The findings of the study reports that professors at the University can use Microsoft Office tools, search engines and internet programs proficiently; the professors perceive that ICT integration drives student-centered teaching methodology and it proliferates the rate of students' learning. However, the professors indicated low online marking and data management skills as well as restricted use of ICT tools in the teaching process. The study also reported a positive relationship competency and use of ICT in the teaching process; this infers that higher the competency of the educators, the probability of educators integrating ICT resources in their teaching increases.

Munienge (2013) explored “The Key Challenges of ICT in Education Faced by Higher Education Institutions in Integrating ICT into Teaching and Learning Process”. It was reported that in various countries, education is regarded more than just a means of assisting progress and eluding poverty, it is viewed as a vital part for the advancement of knowledge societies and knowledge based economies. The role of ICT in education is suggested to be of wide range. It has also been stated that various lessons and instructions can be learned from the best practices of ICT integration from around the world; however, there is no specific or the best technique to determine the finest level of ICT integration in the educational domain. The paper further argued that the chief purpose of ICT integration in education is to provide additional methodologies that can be utilized to address serious challenges such as environmental, cultural and educational faced by the policymakers, educators, administrators and students.

Othman. Md and Tabuk. Al (2013) persuaded a study on “Administration and Integration of ICT in Saudi Universities”. The study tried to highlight the prominence of ICT along with its benefits and applications. It also tried to explore the importance of integrating ICT in Saudi universities, and the challenges in delivering a theoretical model of ICT integration in higher education. Again, the study adopted a descriptive analytical approach to review the related literature regarding ICT integration in classrooms.

The findings of the study reported that ICT integration in classroom played a significant role in the instructional process, assisted in continuing and lifelong education. The findings of the study also indicated that ICT facilitated research works, administrative services and performed as a support system for the universities. ICT integration helped in administration works such as setting up a database for the students, teachers and the administrative staffs. The theoretical model of ICT application in Saudi Universities also yielded positive results and the findings are in line with the current trends in developed as well as developing economies. The integration of ICT has resulted in significant increase in students’ engagement, which results in increased amount of time students spend by working beyond class time. The body of evidence on the influence of ICT on intermediate results, such as motivation, student engagement and independence in learning, is greater and more convincing.

Musa (2011) observed “A Study of Management Attitude, Support and Integration of Information Communication Technologies (ICT) In Higher Education

in Uganda”. The scholar tried to investigate the impact of the management’s attitude on integration of ICT in the classroom environment. The study employed a cross-sectional and correlational study conducted in two public institutions in Uganda: Makerere and Kyambogo. With the help of Pearson’s Correlation Coefficient and linear multiple regression, the collected data were calculated in SPSS.

The findings of the study indicated that the attitude and support of the management towards the integration of ICT in the teaching learning process was reported to be positive. The study reported a lack of infrastructure and proper implementation of ICT tools in the universities. Therefore, the study recommended that ICT integration in universities is the need of the hour. With the provision of appropriate tools, resources, infrastructure and training programmes, ICT integration will affect the quality of education immensely. The management should also play their part in appreciating the dynamics, use and benefits of ICTs to change including the beliefs, feelings, thoughts and reluctance for successful integration of ICTs.

Serin, O (2011) examined a study on “The Effects of the Computer- Based Instruction on The Achievement and Problem Solving Skills of the Science and Technology Students”. The study reported that technology assisted instructions have a constructive impact on the learner’s academic performance in comparison to traditional teachings with transcripts and rote learning. The study was an experimental-control group design with 26 students making up each group.

At the end of the study, the researcher had stated that students in the experimental group who received computer-based instruction had high achievement scores along with a significant increase in their problem solving skills. ICT tools changes the characteristics of learning tasks; thus playing an important task as a facilitator of cognitive development, improving the acquisition of general cognitive competencies. Students making use of ICT tools for learning purposes immerse themselves in the process of learning and as the number of students using computers as a source to acquire information and a cognitive tool, the effect of the technology on supporting how students learn will continue to rise.

Fister (2008) reported the important findings from his study “ The Influence of Tablet PCs in the Improvement of Mathematics Instruction”. The integration of ICT in the teaching-learning process has the potential to increase access and enhancing the applicability and quality of education. The integration of ICT in institutions itself plays the role of a catalyst for transformation in the educational domain. Learners

using ICT for learning purposes become so engrossed in the learning process and as the number of students who use ICT as a source of information and intellectual tools grow; the more the influence of ICT on assisting the students' learning will continuously increase. Additionally, ICT devises the potential to eradicate the barriers that are bringing about the problems such as low rate of education in the country. ICT tools can be used to overcome issues of cost, poor quality education, lack of teachers and demographic barriers hindering acquisition of knowledge. (Mc. Gorry, 2002).

Tondeur. J, Keer. H.V, Braak. J.V. and Valcke. M. (2008) examined together a study on "ICT integration in the Classroom: Challenging the potential of a school policy". Researchers explored ICT integration from the school improvement approach and the relationship between the school policies and the actual implementation of ICT in classroom teaching. The study also examined the local school policy with regards to the Principals' and teachers' perception towards ICT integration. The sample of the study consisted on 53 primary school Principals and 574 teachers from 53 schools in Flanders, Belgium. The study employed stratified random sampling technique for selection of data. For collection of data, interview method was used for the school Principals while a survey and a semi-structured interview was used for the teachers.

The major findings of the study reported that a potential impact on school policies have an actual ICT implementation in the classroom. It was also confirmed that schools with explicit ICT integration policy make use of ICT in their classrooms on a regular basis. It was discovered that most of the teachers believe that ICT integration brings about a positive outcome only when the teachers are well aware of the content and the use of technology. The study also pointed out that there is a lack of communication among the teachers and the principals of the school and teachers often feel left out of the decision making process in the schools. Lastly, the study suggested that it would be wise to engage teachers in the development of policies and plans related to ICT integration in the school as they play a pivotal role in its implementation in teaching and as a result producing better performance and enhanced learning outcome.

Condie and Munro (2007) conducted a study on "Learning Platforms, Mobile Technologies and Computer-Assisted Learning Environments as Information Dissemination Technologies". The study focused on a rapidly becoming vital to the assortment of tools that provisions the school curricula. Furthermore, the students with special needs are supported with specialist technologies such as speech

recognition software and specialist peripherals. Learning platforms and e-portfolios deliver a variety of ICT based functions around communication and collaboration, content management and curriculum planning. ICT escalates the flexibility of knowledge dispersion so that the learners have the freedom to access knowledge from anywhere at any time. With the advancement in the field of technology, the teacher-learning process has moved away from being teacher-centered to being student-centered; ICT plays a vital role on how the students are taught and how the knowledge is perceived by the students. As a result, students are better prepared and well-equipped with vast information for lifelong learning and to improve quality of learning. Instructional technologies also remove temporal constraints faced by the learners with special needs as it removes demographic barriers.

Wims. P, and Lawler. M. (2007) studied on “Investing in ICTs in Educational Institutions in Developing Countries: An Evaluation of their Impact in Kenya”. It tried to define and assess ICT usage in Kenyan schools. The study was carried out to appraise ICT learning programs for students and to evaluate their interest and attitude among parents, teachers and students regarding ICT and to evaluate the positive impact that ICT has had in the lives of the students and how it is improving the teaching-learning practices. The study adopted a mixed method of both qualitative and quantitative design using questionnaire, observation and interview methods for data collection. A semi-structured interview was conducted for 5 Principals, 4 Heads of Department of IT and 4 Computer teachers to establish the background information of the school and to accumulate information about ICT incorporation in the schools. A structured questionnaire was administered to 51 teachers, 155 students and 10 parents to explore the probable attitude, interest and experiences regarding ICT integration in schools. The collected data were presented and analyzed using Bennett’s Hierarchy logic.

The findings of the study indicated that the computers used in schools were equipped only with basic Microsoft Office tools and no educational software was installed, there were no exclusive computer systems set aside for teachers. Poor financial resources were reported in schools and this being the reason for inadequate integration of technology in the teaching practices. Students were also found lacking in computer skills and internet access as a result of absence of training in the field of computer science. However, it was reported that students had high level of interest and a positive attitude towards ICT and its benefits. Teachers and parents also

displayed a positive attitude towards ICT integration in teaching practices. The study further suggested that the knowledge of computer, instructional technologies in education and incorporation of ICT in the teaching-learning process is of utmost importance in the current time. The school authority and administrations should pay keen interest towards enhancement of ICT skills among the students and the teachers to holistically develop the education system in Kenya. It was also stated that ICT offers an exclusive innovative learning environment for learners. Therefore, demanding a combination of different set of skills to excel. Owing to the cumulative growth of information available to the students through a variety of sources, critical thinking, research and assessment skills are of significant importance. The integration of ICT in the teaching-learning is an ever changing process by adding vital elements to learning environments including the virtual learning environments. ICT is a powerful tool offering an array of educational opportunities; it is challenging and perhaps impossible to visualize the future of learning environments that are not ICT integrated.

ICT Process in Secondary School Level

Palagolla, W. and Wichramarachchi, R (2019) conducted a study on “Effective Integration of ICT to Facilitate the Secondary Education in Sri Lanka”. The study tried to explore probable barriers towards effective integration of ICT in secondary schools and the impact of these barriers on the job performance of the teachers in the selected schools. The study employed survey method with a researcher-made structured questionnaire to seek insights to the mentioned objectives. A total of 145 teachers were selected from 30 ICT facilitated schools using simple random sampling technique. The collected data was analyzed using descriptive statistics mean score and frequency, Pearson’s Correlation and ANOVA.

The important findings of the study identified the barriers towards effective ICT integration such as lack of proper infrastructure to facilitate ICT integration, meager administrative support, inadequate school planning, and lack of knowledge in the field of ICT. The findings of the study also reported that ICT utilization is relatively high in teachers who have ICT education than teachers who don’t have. It has also been reported that English language proficiency also plays a major role in ICT utilization in classrooms. Further the study suggested that the government should increase financial allocation to supplement infrastructure to facilitate ICT integration, to increase ICT training centers, to focus on enhancing leadership capabilities among

school heads, to include ICT as a tool for teaching in the school planning and targets for effective integration of ICT in schools.

Kundu. A (2018) conducted a study on “Prospects of ICT Integration in School Education: An Analytical Study of the Government Schools in West Bengal, India”. The researcher tried to explore the impact that ICT has on the teaching-learning process in secondary schools and the barriers in successful implementation of ICT. An attempt was also made to comparatively analyze the views of teachers with regards to the quality improvement of education due to ICT and further made policy recommendations for effective implementation of ICT in schools. The study employed survey method for collection of data using a well-structured researcher-made questionnaire. The sample of the study consisted of 100 teachers from 75 secondary schools in various districts of West Bengal. Descriptive statistics such as mean and standard deviation, multiple regression models and concordance analysis was used for hypothesis testing. The study reported that there is a positive impact of ICT integration on the quality of education in secondary schools. A regression analysis was further carried out and the result of the analysis reports that the coefficient of the variable has shown a positive association with the quality of the education, hence stating that the higher the extent of relative advantage of innovation in the form of ICT, the higher the quality enhancement potentiality of school education. The study also recognized barriers to effective integration of ICT in two levels: internal and external barriers. The internal barriers consist of the teachers’ philosophy of teaching, their competencies regarding technology use and their deeply rooted daily teaching practices. The external barrier consists of inadequate infrastructure to accommodate ICT integration, lack of training and workshops, and lack of facilities and support. The study further made policy recommendations such as investing in infrastructure to enable ICT integration, teacher education colleges to have ICT training, regular workshops on ICT training, improvement of quality based online education and materials and to prepare a well-defined assessment technique to measure ICT integration.

Mwanda. G, Mwanda. S, Midigo. R and Maundu. J (2017) investigated a study on “Integrating ICT into Teaching and Learning Biology: A Case for Rachounyo South Sub-Country, Kenya”. The investigators tried to explore the extent to which computer and technology is integrated in teaching Biology in secondary schools. The study also tried to explore the challenges faced by the teachers in

integrating ICT in the classroom. The study adopted a descriptive-survey design and used a researcher-made questionnaire and observation checklist for data collection. Purposive sampling technique was used for selecting 56 Biology teachers from 15 schools. Mean, standard deviation, frequency and percentage were calculated for data analysis.

The findings of the study reported that schools were not equipped with computers for proper integration of ICT and they lacked infrastructure to do the same. However, the teachers had knowledge of computer application and used it for communication and administration purposes. The results of the study also indicated a positive attitude towards ICT by the teachers although the schools lacked the infrastructure and were not equipped. The study made recommendations based on its findings such as: the schools should provide the teachers with computers and should be accessible to all the students, teacher training institutes should provide proper training on ICT and integration of technology in the knowledge transactional process. The government should also have policies to guide ICT integration in schools for effective learning of the students.

Ngeke. L. V. (2017) made an empirical study on “ICT Integration in Teaching and Learning in Secondary Schools in Tanzania: Readiness and Way Forward”. It tried to investigate the readiness of school administration and teachers on integrating ICT in the teaching-learning process and the knowledge and expertise of teachers with regards to utilization of ICT tools. The sample of the study consisted of 202 teachers from 32 secondary schools in Tanzania. A researcher-made questionnaire with open-ended and closed-ended questions was administered to the participants for data collection. The questionnaire was divided into 4 sections: to determine ICT knowledge, to find out the types of gadgets possessed by the teachers, the level of expertise and knowledge regarding the gadgets and lastly, to determine the infrastructure available at school for ICT integration.

The findings of the study indicated that constant training programmes have been conducted to equip the teachers with ICT knowledge and its integration in the teaching-learning process. In-service trainings have been conducted to disseminate knowledge and ICT skills to the secondary school teachers. The teachers possessed smartphones and laptops, although the number of teachers owning smartphones is higher than the teachers owning both. The findings reported the number of computer systems and ICT tools present in school is low compared to the strength of the

students. The study suggested that schools should provide optimum number of systems and ICT tools to both teachers and students to maximize the learning outcome.

Chepkonga. S. (2015) carried out a study on “An Investigation of the Relationship of ICT Access of Principals and ICT integration in Management Public Secondary Schools in Kenya”. This study tried to explore the relationship between ICT integration in public schools and ICT knowledge of the school heads. The study adopted a descriptive survey design in Nairobi County. Qualitative and quantitative research methods were applied for data collection and simple random sampling technique was used for sample selection. The sample of the study consisted of 68 secondary school Principals. Pearson’s correlation and Chi-Square test were calculated for data analysis.

The findings of the study indicated that the administrators made use of computers and other ICT tools moderately for performing tasks in the office. The study revealed that 48.5% of the administrators make use of ICT for curriculum implementation and to store students’ grades, attendance and timetable. The findings of the study reported that ICT knowledge and accessibility of ICT by the Principals of the schools had a positive relation with ICT integration in schools. Those who showed positive attitude towards ICT and use of technology displayed more use and encouraged teachers to use ICT in the classrooms as well. However, a lack of knowledge and proficiency of ICT skills were reported in the secondary schools in Nairobi County. The study recommended that government should implement policies to provide professional development and to enhance technological knowledge.

Kisirkoi. F. (2015) undertook a study on “Integration of ICT in Education in a Secondary School in Kenya: A Case Study”. The investigator tried to investigate the computer literacy level of the teachers, motivating factor for integration of ICT in the teaching-learning process and the impact of ICT in the teaching learning process. The sample of the study consisted of 30 students and 18 teachers randomly selected from a population of 535 students and 28 teachers. Observation and interview schedule were used as the tools of the study. A researcher made questionnaire was employed for the teachers and observation technique was used for the students.

The findings of the study indicated that majority of the teachers (77%) of the teachers made use of computer to plan their lessons, teach, conduct research and for record saving purposes. The use of technological tools in the classroom provides the

students with the opportunity to interact with modern technology. The primary motivating factor for majority of the teachers (83%) to use technology in the classroom is their drive to teach the students effectively; such attitude and positive approach raises the enthusiasm of the teachers and the learners. The findings of the study reported that integration of ICT in the teaching-learning process enhances students' interest, enthusiasm and creativity. It provides the students with the opportunity to conceptualize abstract ideas and helps in enhancing the retention of knowledge. The exposure of students to computers and technologies help students work on their assignments independently and resulted in better academic performance. The greatest contributor reported in the study for effective ICT integration was the positive attitude of the teachers towards ICT integration and their aspiration to perform better. The study further recommended that schools must take measures to integrate ICT in the classrooms and should provide proper infrastructure and tools for effective integration.

Shrivastav and Garg (2015) studied on "Impact of Learning as a Subject on Secondary School Students' Self-Regulation". The study aimed at comparing self-regulation and its dimensions of students before and after the commencement of ICT as a subject on the basis of the type of school they attend. The study carried out is a single case study quasi-experimental design with a sample size of 1041 secondary school students. The tool employed in the study is Self-Regulation Scale by Brown and Miller (1991) with 63 items based on seven dimensions of self-regulation. The statistical techniques used for data analysis are mean and standard deviation.

The findings of the study reported a significant difference in the self-regulation of students in unaided/private schools, whereas there was no significant difference in the aided schools. The researchers added that this could be because the students in the private schools have more access to practical work and have experience and knowledge regarding the use of technology. The study further implicated that the government and the school authorities in aided schools must put in the effort to ensure that students understand and comprehend the lessons taught in the classroom and to develop computer skills by exposing them to technology and getting hands-on experience for better learning.

Simin, G and Sani. I. M. (2015) observed a study on "Effectiveness of ICT Integration in Malaysian Schools: A Quantitative Study". It aimed at determining the effectiveness of integrating ICT and its effective components in the teaching-learning

process in public schools in Kuala Lumpur. The study was carried out on public primary and secondary schools in Kuala Lumpur, Malaysia. The researchers employed self-made questionnaire with 43 items to find out the effectiveness of ICT integration in teaching-learning process in public schools. A total of 101 teachers were selected as the sample of the study using simple random sampling technique. Both descriptive statistics and inferential statistics were used for analysis of data.

The findings of the study indicate that the teachers should be well-prepared and equipped in terms of their competencies with regards to ICT and should have a progressive attitude towards providing quality education and opportunities for students to improve their performance. It was also reported that ICT integration helps broaden students' knowledge paradigm, ability to integrate with their previous knowledge in the new learning and helps students to learn effectively and further helps in finding related information. It was also found that teachers had a positive attitude towards ICT integration and were aware of its efficacy in the teaching process and the opportunity it provides for effective teaching as well as learning. The study also suggested that ICT integration needs a serious consideration in the school planning in order to increase the competency of teachers and students which will help in the overall development of schools and the countries education system; furthermore, the authorities should organize courses to enhance ICT knowledge for the teachers as the teachers play a major role in implementing and applying ICT in classroom teaching for effective and efficient teaching-learning process.

Andoh. C. B, and Issifu. Y. (2014) examined a study on "Implementation of ICT in Learning: A Study of Students in Ghanaian Secondary Schools". Investigators tried to evaluate the level of utilization of ICT tools by students in secondary schools in Ghana. The sample of the study consisted of 3380 students from 24 private and public schools in 4 regions of Ghana. The selection of schools was based on the student-computer ratio and the schools were sub-categorized in 3 groups: urban, semi-urban and rural schools. A researcher-made questionnaire with 35 items divided into 3 sections was administered for data collection. The questionnaire was divided into three sections viz., Section A: 9 items indicating demographics, Section B: 6 items indicating use of ICT and Section C: 23 items indicating factors related to use of ICT by the students.

The important findings of the study reported that majority of the use of ICT tools by the students was for peer communication. It was also indicated that students

in public schools used ICT for learning purposes more than the students in private schools. Students in urban schools made use of ICT tools for learning compared to the students in semi-urban and rural schools; this could be due to the exposure and accessibility that urban school students have as compared to their counterparts in semi-urban and rural schools. The study highlighted that competence played a major factor in the students' pedagogical use of ICT tools. The findings of the study advocates that students in urban schools are more exposed to ICT tools as compared to semi-urban and rural school students; hence, the government, school administrators and stakeholders should provide training programmes and resources to the students in semi-urban and rural schools to bridge the digital divide existing in secondary schools in Ghana.

Heemskerk. I, Volman. M, Admiraal. W and Dam. G. T. (2011) observed a study on "Inclusiveness of ICT in Secondary Education: Students' Appreciation of ICT Tools". The study tried to find out the appreciation level and inclusion of ICT tools by the students on the basis on gender and origin of the students. The study adopted a survey on 495 secondary school students in 9 schools in various parts of Netherlands. A researcher made questionnaire with 40 questions was employed for data collection; the questionnaire was subdivided into 4 sections: 11 items on content and interface, 11 items on knowledge and skills, 9 items on learning strategies and activities and 9 items on help and students' input.

The findings of the study indicated that students learned better with the help of ICT tools and showed a positive attitude and appreciation towards the integration of ICT in the teaching-learning process. The students also reported that the integration of these tools in education made the topics more interesting and attractive; it helped the students learn the concepts with ease and enhanced the comprehension. A significant difference was reported in the perception on the importance of knowledge and skills where girls perceived that understanding and having knowledge of the tools was important and essential for integration. The study reported that differences in ethnic groups in Netherlands were more difficult to understand and less discussed in the literature. The study suggested that in order to make the ICT tool more inclusive to students from different backgrounds, the data indicated in the study is important to take into consideration the different levels of prior knowledge, especially in the field of computer skills and language.

Rao, J.D.P and Singh, R (2011) conducted the “Measuring Effectiveness of Information and Communication Tools (ICT) in Teaching School Children: A Case Study from Chhattisgarh State, India”. The study focused on finding the effectiveness of ICT through the use of Distance Learning Projector (DLP), computer, charts and chalk and talk method. A non-randomized quasi pre-test and post-test experimental design was adopted in the present study. For the sample of the study, three schools were selected from three districts in Chhattisgarh and 100 students were selected as the participants of the study employing stratified random sampling technique. An experimental study consisting of four groups was conducted using four different instructional designs which are DLP (Distance Learning Projector), Computer/laptop, Chart, and Chalk Talk Method.

The major findings of the study indicated that integration of ICT tools is more efficient than conventional method of teaching school going children. The study reported that the groups with DLP and Computer-mediated instructions performed better than the groups taught with charts, and chalk and talk method. It endorses the claims of various studies regarding the potential of employing ICT tools as a medium of instruction in various subjects in primary, secondary and higher education. Although various disadvantages of ICT tools are reported; the study states that the advantages of ICT integration far overshadow these disadvantages.

Sangra, A. and Sanmamed, M.G. (2010) observed “The Role of Information and Communication Technologies in Improving Teaching and Learning Processes in Primary and Secondary Schools”. The study aimed at finding out teachers’ perception on the areas of instructional process which could be improved through ICT integration and to address the key factors involved for effective use of ICT in the teaching-learning process. The study adopted a multiple case study approach on four different levels of schools categorized based on innovation, equipment and utilization. The study employed interview and self-made questionnaires to explore the intended objectives. A total number of 1222 teachers participated in the study. The findings of the study reported that teachers perceived ICT integration to have a positive impact on responding mechanism, perception, attention, understanding and application of knowledge. It has also been developed that the knowledge transmission process as well is facilitated to a great extent.

The findings also suggested that teachers from Level 4, i.e. the schools with full-fledged ICT integration, demonstrated to have a more favorable view towards

ICT being a great facilitator to the teaching-learning process. The study further suggested that ICT as a tool that contributes to the continuous educational innovation should be considered in the strategic planning and in the lesson plans of each year. It has also been suggested that the teachers should be well-trained in integrating ICT in their teaching process.

Valenzuela. N. C. (2005) investigated “The Level of ICT Use and Expertise by Teachers in Chilean Secondary Schools”. Investigator tried to find out the extent of ICT integration and perceived level of expertise of the secondary school teachers on specific types of ICT. A descriptive survey method was employed in the present study. A total of 74 teachers were selected as the sample of the study. A researcher made questionnaire based on computer education and ICT skills and knowledge were administered.

The findings of the study reported that the frequency of ICT usage was limited and the software available at schools was either the trial version or the manual. There was a lack of proper e-learning software at the schools. The teachers who used ICT used Microsoft Office the most, it was reported that 50% of teachers used MS Office, 38% of the teachers followed the Internet and only 27% of teachers reported to have used spreadsheet software. Only few of the teachers have integrated ICT in the teaching-learning process; very limited teachers have made use of ICT for simulations, data logging, presentations and compositions. The reason could have been the lack of accessibility, limited knowledge and absence of training and workshops. The level of expertise of the teachers reported in the study shows difference in the perceived ICT expertise; it was reported that some of the teachers showed high level knowledge regarding specific software whereas others showed no knowledge on it. Most of the teachers perceived that they had sufficient ICT knowledge which played an important part in integrating ICT in classrooms; whereas some teachers reported that they lacked ICT knowledge and skills overall.

Conclusion

Based on the findings of the studies reviewed above related with ICT process in university level, it can be concluded that ICT integration plays a vital and dynamic role in enhancing the quality of education, effectiveness of knowledge transaction process and learning. The incorporation of ICT in the educational domain provides flexibility, allows students to learn on their own pace, and most importantly, breaks the barriers of time and place. One of the greatest contributions of ICT in the

educational domain is easy access to learning. With the help of ICT, students are able to access e-books, articles, sample examination papers, etc. and have access to teachers, resource persons, counselors, experts, researchers and learners all over the world. The flexibility provided by technology in education has intensified the availability of learning materials and provide better opportunities for learners who had previous constraints by additional commitments. The use of technological instructional tools in the teaching-learning process has been reported to have positive impact on learning of the students as it stimulates the sensory organs. Comenius stated that the foundation of all learning consists in representing clearly to the senses and sensible objects so they can be appreciated easily. The effectiveness of visual resources in learning, estimated that about 40% of the concepts are based on visual occurrence, 25% on hearing, 17% on tactile, 15% on various organic sensation and 3% upon smell and taste.

Based on the findings of the related literature reviewed related with ICT process in secondary school level, it can be concluded that the role of ICT in bringing about a positive change and enhancing the teaching-learning process in secondary schools is highly significant. The studies indicated that students were encouraged and positively affected by the integration of these tools in the learning process. The integration of ICT encouraged student to student and student to teacher interaction, and resulted in an overall development of the classroom environment. Uhomoibhi (2006) reported that e-learning allows students to gather information and study materials faster from any location at any given time. Technology helps individuals overcome the physical barriers of time and place. Students in rural areas can access the information available online and share it within themselves and with the teachers in the area or to different areas. Besides active learning, ICT allows all the human components of schools ranging from the principal, staff and teachers, IT coordinators, and students to engage in collaborative learning and formation of various learning communities. The integration of ICT and utilization of various learning tools in schools can also be used to enhance the perception of students towards learning and the way of learning.

