

Theories of Learning, Information and Communication Technology (ICT) Facilities; Implications for Instructional Delivery

Sylvanus Paulinus Idiong Ph.D

Department of Educational Foundations, Faculty of Education,
Ignatius Ajuru University of Education, Port Harcourt
spidiong@gmail.com, sylvanus.idiong@iaue.edu.ng

Aladejana, Ademola Joseph, Ph.D

Department of Educational Foundations, Faculty of Education,
Ignatius Ajuru University of Education, Port Harcourt

Donatus C. Ukulor, Ph.D

Department of Educational Foundations, Faculty of Education,
Ignatius Ajuru University of Education, Port Harcourt

DOI: 10.56201/ijee.v9.no3.2023.pg89.99

Abstract

Teachers should endeavour to build on the ways children learn from each other by creating a learning environment where there are ample opportunities for student to students' discussion, collaboration and feedback. Example is the ICT support tools like the use of computer, cyber café, multimedia classroom projector, e-library etc. Individuals would be expected to be in good standing with the law. In jobs where people work closely or are highly interdependent, performance may include the degree to which a person helps out the groups and his or her colleagues. This might include acting as a good role model, coaching, giving advice or helping maintain group goals. Many jobs also have a supervisory or leadership component. The individual will be relied upon to undertake many of the things delineated under the previous factor and in addition will be responsible for meeting out rewards and punishments. The present papers is on the theories of learning and information and communication technology (ICT) facilities; implications for instructional delivery.

Keywords: *Communication, Instructional Delivery, Theories of Learning, Information, Technology*

Introduction

This review highlights ICT facilities as it predicts teachers' instructional delivery in public secondary schools. Theoretical frameworks supporting the study were; Expectancy Theory propounded by Victor H. Vroom (1964), stimulus – response (R - S) theory of learning propounded by Edward Lee Thorndike (1944) and Socio-cultural Theory of learning propounded by Lee Vygotsky (1936). Vroom's Expectancy Theory of learning implies that teachers will be motivated if they believe that strong effort will lead to high effectiveness and high effectiveness will lead to desired rewards. Moreover, ICT facilities encourages teacher's innovation and

innovative teachers can motivate students a lot by relating classroom learning to future needs and lives of the learners. Thorndike's theory of learning implies that, teachers should continue to work constantly by ensuring that there is something new in what is to be learnt as well as the variation of teaching methods for effective teaching. ICT has introduced a lot of variable in teaching - learning processes. Vygotsky's Theory of learning implies that teachers' instructional delivery can be enhanced when teachers work effectively by using scaffolding at any given opportunities most especially when students need help with self-initiated learning activities. Scaffolding helps students to attain a higher level of skill and knowledge. Thus teachers should always be ready to offer learners with enough assistance, observe their attempts and encourage them to practice more through ICT e-facilities in schools and homes (Telem, 1999; Stewart, 2000; Sofoluwe, 2007 and Shah, 2014). The present paper is on the theories of learning and information and communication technology (ICT) facilities; implications for instructional delivery.

Information and Communication Technology (ICT)

ICT is well automated to ease manual work, stress and information transfer. It could be very useful to teachers and other users of information if it is effectively utilized. ICTs has virtually changed the way people live and work in teaching and learning, in research, management, industry, information management, libraries, information services, business, national economy, international affairs, among others. Indeed nothing can be successfully done without ICT. Ayo (2001) remarks that ICT is one of the most potent forces shaping the 21st century. It has the potential to accelerate, enrich and deepens skills. The history of the use of information and communication technologies in education is relatively short. Before 1979, the computer existed primarily in tertiary level of educational institutions. Then, in the eighties, microcomputers began to be distributed to schools and teachers began to grapple with the questions of how to use computer for education rather than simply educating about computer. Starting from the mid-nineties, the use of ICTs in schools rapidly expanded in developed nations through curriculum support, networking, the professional development of teachers and software improvements (Aston, 2002). A growing number of researchers and educators began to develop application that used hypertext, multimedia and networking to build cognitivist and constructivist learning environments aimed at improving learning (Scardemedia and Schrank, 1999).

Nevertheless, these applications were initially found to be ineffective in attaining better results as compared to learning outcomes achieved through traditional pedagogies and assessed against traditional metrics. According to Pelgram (2003), this finding was largely influenced by teachers and learners' lack of familiarity with ICTs. In recent years, the web and ICTs in general has evolved, contributing to an improvement in learning outcome. Some are referring to this evolution as numbered "versions" or "generations" (web. 1.0, 2.0, and 3.0) Web 1.0 refers to the first implementation of the web which mainly allowed users to search for information and read it. The main goal of organizations creating such web as a whole has not moved beyond this stage yet. Web 2.0 refers to the trend in social networking tools that have existed for a number of years (forums and charts) but there are new trends in communication and collaboration tools which are emerging (e.g. Face book, folksonomics and blogs). Web 3.0, an emerging concept, refers to the artificial intelligence applications that will increasingly become integrated into the web, as well as to the increasing interoperability that users will have between the diverse information data bases and information sources on the web.

Expectancy Theory of Learning: Victor H. Vroom (1964)

This theory was proposed by Victor H. Vroom (1964) in Yale school of management. The tenet of Vroom's expectancy theory assumes that behaviour results from conscious choices among alternatives whose purpose is to maximize pleasure and minimize pain. The theory also emphasizes that individuals are motivated towards certain things in response to certain expectations. For instance, one becomes a teacher so as to distinguish himself from his /her contemporaries. Thus, the individual's level of motivation depends on what he expects to achieve within the system. Vroom's work revealed that an employee's performance is based on individual's factors such as personality, skills, knowledge, experiences and abilities. Vroom's theory proposes that a person will decide to behave or act in a certain way because he is motivated to select a specific behaviour over other behaviours due to expectation of outcome of the selected behaviour. In other words, the motivation of the behaviour selected is determined by the desirability of the outcome. At the core of the theory is the cognitive process of how an individual processes the different motivational elements. This is done before making the ultimate choice. Vroom's expectancy theory emphasizes the need for organizations to relate reward directly to performance and to ensure that the rewards provided are those rewards deserved and wanted by the recipients. The theory suggests that although individual may have different sets of goals, they can be motivated if they believe that:

- ◆ There is a positive correlation between efforts and performance.
- ◆ Favourable performance will result in a desirable reward.
- ◆ The reward will satisfy an important need.
- ◆ The desire to satisfy the need is strong enough to make the effort worthwhile.

The expectancy theory of motivation is one of the process theories. It is a model of behaviour choice. It explains why individuals choose one behavioural option over others. By so doing, it explains the behavioural direction process. It does not explain what motivates individual but rather how they make decisions to achieve the end they value. Vroom's expectancy theory holds that motivation is a function of valence times expectancy i.e $M = F(VE)$.

Expectancy: Is the belief that one's effort (E) will result in attainment of desired performance (P) goals, usually based on an individual's past experience, self confidence (self efficacy) and the perceived difficulty of the performance standard or goal. Factors associated with the individual's expectancy perception are self efficacy, goal difficulty and control. Self efficacy is one's belief about the ability to successfully perform a particular behaviour. Goal difficulty happens when goals are set too high or performance expectations made too difficult that are most likely to lead to low expectancy perceptions. Control is one's perceived control over performance.

Instrumentality: Performance-Outcome (P-O) Instrumentality is the belief that a person will receive reward if the performance expectation is met. This reward may come in the form of a pay increase, promotion, recognition or sense of accomplishment. Instrumentality is low when the reward is the same for all performances given. Factors associated with the individual's instrumentality for outcomes are trust, control and policies.

Valence: V(R) Valence is the value the individual places on the rewards based on their needs, goals, values and sources of motivation. Factors associated with individual's valence for

outcomes are values, needs, goals, preferences and sources of motivation strength of an individual's preference for a particular outcome.

The implication of Vroom's Expectancy Theory to the study is that the expectancy theory of motivation goes a long way to help teachers understand how individuals make decisions regarding various behavioural alternatives. Once behaviour is energized then the likely behavioural alternatives that one pursues is noticed. Vroom's expectancy theory encourages alternative supplement to formal training in schools and colleges in order to improve teaching-learning activities. It fosters the use of team building activities and retreat in schools and thereby breaking down barriers, decreasing division and fostering understanding. In order to improve the effect-performance tie in schools, educational managers should ensure that teachers are constantly trained through organized workshops and seminars. This will indeed improve learning and better performance of students. Most of the beliefs that teachers hold about students are often accurate. This teachers' expectation can definitely reflect student's actual performance level. For effective learning, teachers should use teaching techniques and methods that tie reward very closely to students' performance. Rewards such as recognition, scholarship, etc should be given to exceptional students. This can motivate others to study assiduously. In teaching - learning process, teachers can influence students' behaviours to learn by setting of goals and targets. Motivation is a goal - oriented process. When there is a goal to be attained, students are generally motivated to learn more. Beside the setting of goals by teachers, students should also be encouraged to set goals for themselves and pursue them with all amount of seriousness. To improve upon the performance of students, principles of pleasure and pain 'should be applied in teaching - learning process. Generally, pleasant experiences are usually sought for because it brings satisfaction while painful experiences are usually avoided. Human beings are often motivated into action by some needs. Thus, for effective learning to take place, learners should be encouraged through the exposition of such needs as they engaged in learning activities. In teaching - learning process, both teachers and students would participate actively if they are rewarded and praised in their good performances. However, some people should be rewarded and praised for minor achievements, just to encourage them because of their limited abilities. Others should be rewarded and praised for very worthy accomplishment because of their high abilities. This arouses maximum interest and enhances effective teaching - learning activities. Vroom's expectancy theory can help educational managers to understand how individuals make decisions regarding various behavioural alternatives. It can help us to evaluate teachers' effectiveness.

Finally, Secondary School teachers in Akwa Ibom North-West Senatorial District will increase their effectiveness if they perceive all three construct to be high. That is, if they see a high performance; see a high probability that high performance will lead to outcomes and view the outcomes (e.g. the reward system) to be positively attractive. In other words, they will be motivated if they believe that strong effort will lead to high effectiveness and high effectiveness will lead to desired rewards. Moreover, ICT encourages teacher's innovation and innovative teachers can motivate students a lot by relating classroom learning to future needs and lives of the learners.

Stimulus - Response (S-R) Theory of Learning: Edward Thorndike's (1944)

The chief proponent of this theory was Edward Thorndike. Thorndike's theory is known as connectionism. The tenet of this theory is that, an individual tries learning many different responses when faced with a problem he/she cannot solve using his/her previous knowledge or learned behaviour. On getting the right response, the individual forms an association or connection between the stimulus and the response. This stimulus is likely to occur under similar circumstances. Due to the fact that, the response followed by satisfaction is strengthened or reinforced, Thorndike emphasized the importance of reinforcement in learning. Thorndike conducted so many experiment for example the investigation of learning in animal using cats. A hungry cat was confined in a puzzle box with food visible on the outside. The cat had to escape to get food. In the inside was a release mechanism which could be operated by the cat. When first placed in the box, the cat exhibited a random movement. It plunders scratches and tries to escape to get food. However, it operates the release mechanism which allows it to escape and gets food. On subsequent trials, the activity becomes less random and focused on the part of the cage near the released mechanism. When the time to escape decreased the animal eventually operates the release as soon as it finds itself in the cage. Conclusively, Thorndike proposed that animals learn through active behaviours accident and through chance to succeed. This learning theory is "Trial and Error", or "Trial and Succeed". Through trial and error, the stimuli (s) of the puzzle box were connected with the response (R) which brought about release. From his series of experiments, Thorndike concluded that learning is not insightful but rather incremental. This implies that learning occurs in gradual and systematic manner and not a sudden flash reflecting on huge jump at the solution. The animal was activated or motivated to learn to satisfy its hunger. Learning is direct and may not have involved mediating factors such as thinking or reasoning. But rather, the animal's instinct and experiences help it determined the suitable reaction to the situation or circumstances inside the puzzle box. On the basis of this experiment Thorndike suggested certain laws which govern the learning of organisms, human and non-human. The laws are:

- ▶ **Law of Effect:** Effect is the satisfaction or dissatisfaction which the animal desires from performing the tasks or for making response. If it performs the task satisfactorily and the reward is delayed it can lead to frustration. If a pleasurable situation follows a learning situation, the learning will be remarkable and strong in the future.
- ▶ **Law of Exercise:** The law of exercise relate to repeating or failing to repeat a connection. Practice is required especially in learning skills (simple and complex) repetition also strengthens the connection between the stimulus and the response.
- ▶ **Law of Readiness:** The law of readiness is an aspect of the law of effect. It has to do with the tendency of the physiological neurons to operate or to "conduct" in order for connections to be made. The organism must be mentally set to perform the instrumental behaviour owing to some motivation. In this case, Thorndike used hunger as motivation.

Implications of Stimulus - Response (S-R) Theory of Learning

Implications of this theory to the study is that it encourages teachers to constantly ensure that there is something new in what is to be learnt as well as the variation of teaching methods for effective teaching. ICT has introduced a lot of variable in teaching - learning processes. More so, learning materials are presented in segmental order, proceeding from simple to complex or known to unknown. Teachers should ask question which may at times reveal learner's ignorance and thereby arousing their interest and curiosity to learn new lessons and they should test learner's previous knowledge and introduce the lesson within an explanation. Again, they should

emphasize on practice, give learners copies and a variety of exercise, assignments, homework and projects. Mental drill may be used at the junior classes and practice work and continues assessment opportunities should deliberately be created to make learners do, say or write answers to questions or problems. Furthermore, teachers should endeavour to reward satisfactory performance of the learner. This will motivate learner to willingly learn further in order to excel and maintain the good impression led by the teacher about his or her achievement. The knowledge of results of examination, test, class exercise, and assignments reinforces tendencies to learn. Hence, teachers should promptly mark and give feedback to learners on their achievement. At the junior secondary, the play-way method should be the focus of learning activities and learning materials should be related to the real life situations within the learner's environment. This is done by giving examples that are relevant and could easily be appreciated, grasped and remembered by the learner.

Socio-Cultural Theory of Learning: Lev Vygotsky's (1936)

The chief proponent of this theory is Lev Vygotsky, a Russian psychologist. The tenet of this theory is that knowledge is constructed in the midst of our interactions with others and is shaped by the skills and abilities valued in a particular culture. The proponent maintained that language is the main tool that promotes thinking, develops reasoning, and supports cultural activities like reading and writing. Vygotsky noticed that children solve their problems with their speech as well as with their eyes and hands. They talk aloud to guide their own thinking process. Eventually, as children mature, the words they speak aloud help them to solve problems and to ask for guidance becomes internalized. Vygotsky therefore hypothesized that this process is the basis for learning. The speech that we use aloud and with others eventually becomes internalized as part of our repertoire of strategies for problem solving. He suggested that language helps children to be strategic, rather than purely impulsive. In their approach to complex problems, it helps also to gain control over their own thinking and behaviour. Vygotsky also noted that social interaction plays a fundamental role in the development of cognition. For Vygotsky, learning occurs through participation in social or cultural embedded experiences. Learner does not learn in isolation. Learning therefore is strongly influenced by social interactions which take place in meaningful contexts. It is in the light of this social cultural context that Vygotsky called attention to the ways in which social environment influences learning process. Vygotsky proposed the idea that learning and development take place in the interactions children have with peers as well as with teachers and other adults. In a variety of ways, these social interactions form the basis of the understanding that eventually becomes internalized in the individual. The classroom teacher plays a key role in shaping these social interactions when he/she carefully assess students' current understandings and creates situations that allow students to grow further. This is generally known as "assisted performance". In this situation, teachers should endeavour to build on the ways children learn from each other by creating a learning environment where there are ample opportunities for student to students' discussion, collaboration and feedback. Example is the ICT support tools like the use of computer, cyber café, multimedia classroom projector, e-library etc.

In this theory, the proponent came up with the concept of the Zone of Proximal Development (ZPD). This concerns that area between what a learner can do independently (mastery level) and what can be accomplished with the assistance of a competent adult or peer (Instrumental level). Vygotsky opined that any child could be taught any subject effectively using scaffolding

techniques by applying the Z.P.D. Students should be guided and supported through learning activities that serve as interactive bridges to get to the next level. Vygotsky also emphasized that the use of inscriptions for teaching scientific inquiry and examination, the use of external representations, representational scaffolds can serve as an effective strategy for teaching scientific skills. Scaffolding emanated from Vygotsky's socio-cultural theory and his concept of the Zone of proximal development (ZPD). Scaffolding instruction is the role of teachers and others in supporting the learner's development and providing support structures to get to the next stage or level. It is worthy to note that scaffolding is temporary. As the learner's ability increases, the scaffolding provided by the more knowledgeable order is progressively withdrawn. After a while, the learner will be able to complete the task or master the concepts independently. According to the proponent, the following are the characteristics of scaffolding

- ◆ Provides clear direction and reduces students' confusion - Educators anticipate problems that students might encounter and then develop step by step instructions which explain what a student must do to meet expectations.
- ◆ Clarifies purpose- Scaffolding helps students understand why they are doing the work and why it is important.
- ◆ Keeps students on task- by providing structure, the Scaffolded lesson or research project, provides pathways for the learners. The students can make decisions about which path to choose or what things to explore along the path but they cannot wander off of the path, which is the designated task.
- ◆ Clarifies expectations and incorporates assessment and feedback- Expectations are clear form of the beginning of the activity since examples, rubrics and standards of excellence are shown to the students.
- ◆ Points students to worthy sources - Educators provide sources, reduce confusion, frustration and time. The students may then decide which of these sources to use.
- ◆ Reduces uncertainty, surprise disappointment-Educators test their lessons to determine possible problem areas and then refine the lesson to eliminate difficulties so that learning is maximized.

The relevance of Socio-Cultural Theory of Learning

The relevance of this theory is that teachers should endeavour to use more - skilled peers as support and guidance to enhance learning. A child cannot be said to have a ZPD but rather shares a ZPD with a more skilled individual. Teachers should therefore transform the classroom with Vygotskian ideas. The key element of classroom instruction should be the zone of proximal development. Children might read a story and interpret its meaning. Many of the learning activities should take place in small groups. Children should spend at least 20 minutes each morning in activities called "Centre One", in which scaffolding is used to improve their literary skills. Teachers ask questions, respond to students queries, and build on ideas they generate. Teacher should use child's Zone of Proximal Developmental in teaching. Instruction should begin toward the zone's upper limits where the child is able to reach the goal only through close collaboration with the instructor. With continuous instruction, the performance is transferred from teacher to child. The teacher gradually reduces the explanations, hints and demonstrations until the student is able to perform the skill alone. Once the goal is achieved, it may become the foundation for the development of a new ZPD. Definitely, this theory is very important to the study in that teachers work effectively by using scaffolding at any given opportunities most especially when students need help with self-initiated learning activities. Scaffolding helps

students to attain a higher level of skill and knowledge. Thus teachers should always be ready to offer learners with enough assistance observe their attempts and encourage them to practice more through e-facilities in schools and homes.

Implications of the Concept of Instructional Delivery

A successful instructional delivery depends on the talent, skills and commitment of workers in educational organization. Instructional delivery is a commonly used, yet poorly defined concept. It most commonly refers to series of activities to impart knowledge and skill. Instructional delivery is a very important criterion that relates to organizational outcomes and success, it can also be viewed in the light of job performance. Among the most commonly accepted works of job performance is the work of Campbell (1990). Campbell describes job performance as an individual level variable. That is, performance is something a single person does. This differentiates it from more encompassing constructs such as organization performance or national performances which are higher level variables. There are several key features to Campbell's conceptualization. These are:

Performance and Outcomes: Campbell defines performance as behavior. It is something done by the employee. This concept differentiates performance from outcomes. Outcomes are the result of an individual's performance, but they are also the result of other influences. Thus, there are more factors that determine outcomes than just an employee's behavior and actions. Campbell allows for exceptions when defining performance as behavior. For example, he clarifies that performance does not have to be directly observable actions of an individual. It can consist of mental production such as answers or decisions. However, performance needs to be under the individual's control, regardless of whether the performance of interest is mental or behavioural.

Organizational Goal Relevance: For Campbell, another key feature of job performance is that it has to be goal relevant. Performance must be directed towards organizational goals that are relevant to the job or role. Hence, performance does not include activities where effort is expended toward achieving peripheral goals.

Multidimensionality: Despite the emphasis on defining and predicting job performance it is not a single unified construct. There are vastly many jobs each with different performance standards. Therefore, job performance is conceptualized as a multidimensional construct consisting of more than one kind of behaviour. Campbell (1990) proposed an eight-factor model of performance based on research that attempts to capture dimensions of job performance existent (to a greater or lesser extent) across all jobs. The first factor is task specific behaviours which include those behaviours that an individual undertakes as part of a job. They are the core substantive tasks that delineate one job from another. The second factors, non-task specific behaviours, on the other hand are those behaviours which an individual is required to undertake which do not pertain only to a particular job.

Summary and Conclusion

Written or Oral Communication Tasks refer to activities where the incumbent is evaluated, not on the content of a message necessarily, but on the adeptness with which they deliver the communication. Employees need to make formal and informal oral and written presentations to various organizations. An individual's performance can also be assessed in term of effort, either day- to- day, or when there are extraordinary circumstances. This factor reflects the degree to

which people commit themselves to their services. The Performance domain might also include an aspect of personal discipline. This aspect of performance happened in a face to face manner. Managerial and administrative performance entails those aspects of a job which serve the group or organization but do not involve direct supervision. A managerial task would be setting an organization goal or responding to external stimuli to assist a group in achieving its goals. Campbell, Mchenry and Wise (1990) suggested determinants of performance components. Individual differences on performance are functions of three main determinants; declaratives knowledge, procedural knowledge and skills and motivation. Declarative knowledge refers to knowledge about facts, principles, objects etc. It represents the knowledge of a given task's requirements. For instance, declarative knowledge includes knowledge of principles, facts, ideas, etc. If declarative knowledge knows what to do, procedural knowledge and skill knows how to do it. Procedural knowledge includes cognitive skill, perceptual skill, interpersonal skill, etc. The third predictor of performance is motivation, which refers to "a combined effect from three choices behaviours- choice to expend effort, choice of level of effort to expend, and choice to persist in the expenditure of that level of effort (Campbell, 1990). It reflects the direction, intensity and persistence of volitional behaviours. Campbell (1990), states that the only way to discuss motivation as a direct determinant of behavior is as one or more of these choices. Campbell et al., (1990) mentioned several performance setting and should be investigated by industrial and organizational psychologists. The first one is the distinction between speed and accuracy. This distinction is similar to the one between quantity and quality.

Important questions that should be considered include: which is most valued by the organization, maximized speed, maximized accuracy, or some balance between the two? What kind of tradeoffs should an employee make? The latter question is important because speed and accuracy for the same task may be independent of one another. The second distinction is between typical and maximum performance. Campbell et al., (1990) did a study on supermarket cashier and found that there was a substantial difference between scores reflecting their typical performance and scores reflecting their maximum performance. Regular work situations reflect varying levels of motivation which result in typical performances. Special circumstances generate maximum employee motivation which results in maximum performance.

References

- Ayo, C. K. (2001). *Information Technology Trend and Application in Science and Business*: Lagos Concept Publication, p. 234.
- Campbell, J. P., Mchenry, J. J. and Wise, L. L. (1990). Modelling Job Performance in A Population of Jobs. *Journal of Personnel Psychology*, 43(2): 313-575.
- Lau, B. T. (2006). 19 ways of Determining the Extent of ICT Adoption Among Secondary School Teachers in Malaysia. Available at: <http://aticiteseerx.ist.psu.edu/viewdoc/suma>. Retrieved on 8th February, 2016.
- Modebelu, M. N. and Onyali, L. C. (2014). Qualitative Record Management Skills for Effective Service Delivery in Nigerian Education System. *American Journal of Educational Research*, 2(12):1250-1256.

- Nasser, R. N. (2008). A Formative Assessment of Information Communication Technology in Lebanese Schools. *International Journal of Education and Development*, 4(3):27-30.
- Neo, M. and Neo, T. K. (2001). Innovative Teaching: Using Multimedia in A Problem –Base Learning Environment. *Educational Technology and Society*, 4(4):36-45.
- Ng, K. H. and Komiya, R. (2000). Introduction of Intelligent Interface to Virtual learning Environment: A Paper Presented at the Multimedia University International Symposium on Information and Communication Technology. October 5-6 in Petaling Jaya, Malaysia.
- Nkanu, W. O. (2003). Digital Divide: Bridging the Gap through ICT in Nigerian Libraries. Available at: www.academia.edu/159155915509/THE-EFFEC... Retrieved on 30th October, 2015.
- Pelgram, W. J. (2003). Obstacles to ICT Implementation and Integration into Basic Schools in Libya. Available at: www.academia.edu/53031368/obstacles-... Retrieved on 24th May 2014.
- Raymond, E. (2000). The Theory of the Zone of Proximal Development and Scaffolding. *The Write Pass Journal*, 2(4):170-176.
- Reid, S. (2002). Computer as ICT Support Tools and Teachers Service Delivery in Ontario Secondary Schools in Alberta. *Journal of Educational Research*, 17(1):3-8.
- Roller, M. and Wavermart, S. (2011). Impact of ICTS on Learning and Achievement. A Knowledge Map on Information and Communication Technologies in Education. Available at: infodev.org/articles/impact-ictlearning.ad. Retrieved on 3rd January, 2017.
- Shah, M. (2014). Impact of Management Information Systems (MIS) on School Administration: what the Literature Say: Available at: doc:10.1016/j.sbpro.2014.01.659. Retrieved on 16 December, 2015.
- Sofoluwe, S. A. (2007). Information and Communication Technology and Administrative Effectiveness of Nigeria Universities. *International Journal of Education Management*, 2 (3):43-56.
- Stewart, J. (2000). *Cafematics: The Cyber Café and the Community Informatics: Enabling Communities with Information and Communication Technologies*. Hersey, PA: Idea Group Publishing, p. 339.
- Telem, M. and Buvitski, T. (1995). The Potential Impact of Information Technology on the High School Principal: A Preliminary Exploration. *Journal of Research on Computing in Education*, 27(3):281-297.

Telem, M. (1999). A Case of Impact of School Administration Computerization on the Department Head's Role. *Journal of Research on Computing in Education*, 13(4):385-401.

Thorndike, L. E. (1944). Thorndike Constructionism Theory. Available at: www.en.wikipedia.org/wiki/Edward_Thorndike. Retrieved on 13th August, 2015.

Vroom, V. H. (1964). *Work and Motivation*. New York: McGraw-Hill.

Vygotsky, L. (1978). Interaction between Learning and Development. *Readings on the Development of Children*, 23(3): 34-41.