Use of ICTs to Students' Performance in Secondary Schools Classroom in Tanzania

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Abstract: **Students are core objects in any school systems activities. This paper depicted to find out students learning performances vested into teacher's procedures and approaches for lesson preparation, introduction, delivering and reinforcement using ICT mediated as teaching and learning tools with assumptions classrooms are subsystem intended to reach best outcomes. Social Cultural theory (SCT) depicted into system activity theory (SAT) (Vygotsky, 1978; Engeström, 1987) guided the study. Pragmatism paradigm insisting in viewing, analyzing and expressing findings of phenomenon in multi-views expressively into mixed descriptive exploratory design. Mixed techniques were used to collect quantitative and qualitative data; peer quasi experiment observation was conducted whereby selected teachers exposed the same group of students in classroom activities using traditional and technology mediated teaching and learning approaches. Kibaha district, Pwani region, Tanzania was the study area. Data collection tools administered was four ranked Likert scale questionnaire and semi-structured interview. The sample involved 6 classroom teachers non-probability purposively selected from 3 government secondary schools; also, simple randomly selection was administered to obtain 50 cases of peer-observers and 10 interviewed teachers. The inter-item reliability in questionnaire hold Cronbach's alpha of 0.713. Collected data was analyzed using SPSS and thematic content. The findings endure to show importance of technology in changing students' learning activities.**

Key Words: **ICT, teaching and learning, students, classroom**

I. INTRODUCTION

Tanzania Education Policy (1999) and its review (2014) recognized ICT as teaching and learning tool in education system secondary level being among (URT, 1999; 2014). Currently, Tanzania is visionaries to pick-up and became industrialized-middle earning economy whereby efforts to change quality of future human capital are vested in schools particular secondary education level which is a bridge between basic primary and tertiary, university education. Among the fostering strategies are students exposition to ICTs in and out of classroom activities to foster quality of future human capital as Kozma, (2005) alerted ICTs are important tools for transforming education practices and Shahadat et. al., (2012) added students learning environments are improved by providing opportunities to practice, analyze, offered better access to relevant enriched articles for teaching and learning activities. Future social-economic development of the country, struggles to attain into sustainable and development goals are highly dependent on future man power ability which are currently students as Rubagiza, Were, Denley and Sutherland,

(2007) declared, ICTs plays an important role in preparing individuals in schools for workplace while Mumtaz, (2000) and Hattie, (2009) emphasized on ability of technology to facilitate gaining positive effects on students learning.

Sided with constructivists using ICTs for teaching and learning is psychological activity focused on learners' role to construct views/models of material (Kohler, 1926). Tanzania education system witnessed a great shift brought by ICTs in helping students to develop critical thinking, creativity, collaboration, better communication and innovation (Sanga et.al, 2013; Josephat et.al, 2013). Basically, use of technology draw students concentration, built analytical skills supportive for designing own free curriculum enriched with practicality of real life situation as Lu, Hou and Huang, (2010) affirmed, use of ICTs in classrooms leads active involvement in pedagogical processes and Shah, (2013) ascertained technology has to be equipped with educational affordances and possibilities to enables learners' autonomy for making own decisions and plans.

Use of technologies in classrooms should strive to built cognitive, affective and psychomotor domains in better and easier ways comparatively to traditional teaching and learning approaches as students strived to engage and involve in free interactive space bedded into long learning process as Johassen, (2000) asserted student constructs knowledge through increasing engagement in learning process; also Eady and Lockyer, (2013) emphasized on students to make best use of digital tools while Kay, (2007) stressed on ICTs activities to focus on students utilizing visual dimension such as digital videos, photography or video conferencing. Furthermore, McClanahan, (2012) proclaimed on use of ICTs enabled students to gain self-confidence and sense of control to learning equated in developing new creativity and understanding to optimize learning (Chai, Koh and Tsai, 2010).

1.1 Statement of the Problem

Tanzania government is striving to implement ICT in education policy into practices collaboratively with partners and stakeholders such as HDiF, DBTi, Smartlab, Project Inspire, Africa Digital School Initiatives (ADSI), Shule Direct, Kasome International, AMCET lab and multi-donors through creation of conducive and supportive environment to cheap in designing, establishing and put into practicality various technological tools, platforms, conduct ICT for

education projects and programs to fosters uses in secondary schools teaching and learning particularly to students as final consumers. There are multi observable challenges in secondary schools ecosystem facing students as affiliated unit reflectivity in Certificate of Secondary Education Examination (CSEE) results where pass rates for division one to three are 27.6% (2016), 30.15% (2017) and 31.76% (2018) (Necta, 2016, 2017, 2018) and mostly ended up holding division four to zero which doesn't enable school levers getting formal chances to progress with advance secondary education and very few are articulated to join tertiary education level. Setbacks resulting to students failures are due to shortage of text and reference books, learning time limits, shortage of teachers especially in science and mathematics subjects, conflicting medium of instructional (English) and social communication (Kiswahili and other vernaculars) languages; teachers' competencies in specialized teaching subjects all of which could be minimized if not solved through use of ICTs. However use of technology handheld devices as pedagogical tools such as smartphones, iPad, iPod and laptop increased exposition to various sources of knowledge, place, pace and foster students' interactive long learning. Therefore, the study aimed to find teachers' views on use of ICT to students' performances in secondary schools classrooms.

1.2 Purpose of the Study

The main study purpose was to analyze teachers' views in use of ICT to students' performances in secondary schools classrooms under comparative base of traditional teaching and learning approaches.

II. METHODS AND MATERIALS

The study was conducted at Kibaha district in Pwani region, Tanzania. Peer observational quasi experimental design was conducted followed by administering semi structured interview and four ranked Likert Scale questionnaire to collect qualitative and quantitative data. Targeted population was 12 secondary schools and 120 classroom teachers, further sample involved 6 classroom teachers purposively selected to teach students using traditional and technology mediated approaches drawn from 3 government secondary schools; 50 peer-teachers observers and 10 interviewed teachers whom were selected using simple randomly techniques (Kothari, 2014; Kumar, 2011). Questionnaires inter-item reliability presented Cronbach's alpha of 0.713. Quantitative data was analyzed using SPSS and thematic-content employed in analyzing qualitative data. Data were presented using charts, frequency tables and narratives.

III. RESULTS AND DISCUSSIONS

The results and discussions are presented peculiarly on ICTs use in attributes of lesson preparations, delivering and feedback towards students' performance. These attributes are presented basing to measurable indicators.

3.1 Use of ICTs for Lesson Preparation to Students' Performance

Interview findings pictured out use of ICTs enables teachers to be more familiar and competent in subject lesson content before entering in classroom therefore simplifying and enrich subject lesson content that facilitates students understanding and performance. Interview was guided with the question *"How do you compare traditional against ICT mediated teacher's competencies in subject lesson content preparation?"* The respondents declared:-

> *"Content prepared using ICT tools is more elaborative, enriched with illustrative videos, animations and pictures visible to students directly during lesson presentation compared to traditional approaches whereby teacher had to pose for drawing on chalkboard fluctuating students receptive content flow in cognitive schemas."*

> *"Subject lesson content prepared through ICT borrows information from multi-resources proved through quotations compared to traditional modality where observed teachers were using single source subject textbooks."*

Quantitative findings on teachers' competence in ICTs lesson content preparation to students performances revealed: 14 somehow competent make 28%, 20 competent imply 40% and 16 strongly competent make 16% as presented in table 3.1

Table 3.1: Teachers' ICTs Competencies for Lesson Preparation (n=50)

Status	Frequency	Percent	Valid Percent	Cumulative Percent
Somehow Competent	14	28.0	28.0	28.0
Competent	20	40.0	40.0	68.0
Strongly Competent	16	32.0	32.0	100.0
Total	50	100.0	100.0	

SOURCE: Field Data; 2019

3.2 ICTs Use for Lesson Delivering to Students' Performance

Students are objects of school system obligatory to benefit in classroom activities reflectively to acquisition of lesson and curriculum objectives (outcomes). ICTs use focused in developing enriched subjects' lessons focused on incorporation of practices, procedures, strategies and approaches possessing multiple activities to fit needs of individuals, paired and groups of students. Moreover, indicators to measure students' performances in classroom blended with ICTs mediation concentrated on lesson introduction, accessibility of Open Education Resources (OERs), teachers' level of verbalism, students' communication, collaboration and team work, students' engagement and concentration, students' knowledge creation ability, teachers' ability to merge technology, pedagogy, content and knowledge.

3.2.1 ICT for Lesson Introduction to Students' Performance

Technology had ability in hooking and contextualizes knowledge; qualitative findings obtained through interview schedule were guided with item "*How ICTs does helps students to hook and contextualize new learnt knowledge comparatively to traditional mode*?" Respondents exposed:

> "Using technologies facilitate students to accommodate new abstract content compared to traditional ways whereby integration of lesson content in classroom is ambiguous." Subject teachers assisted students to link previously with new contents through use of various ICT tools through creation of virtual learning environment using videos, animation, active lesson activity procedures for explore and link real life experiences students hold in mind therefore assisting in contextualization of delivered content."

Conversely, quantitative findings portrayed: Hook: 6 agreed strongly assist make 12%, 18 assist make 36 %, 23 somehow assist make 46% and 3 not assist equals to 6% of previous knowledge students held to new subject lesson content. Level of lesson contextualization using ICTs depicted: 2 not assist (4%), 12 somehow assist (24%), 23 Assist (46%) and 13 strongly assist (26%) for students to link new learnt content to routinely exposed skills and knowledge as shown in bar chart 3.2

**Bar Chart 3.2: ICTS level for Hooks and Lesson Contextualization (n=50)**
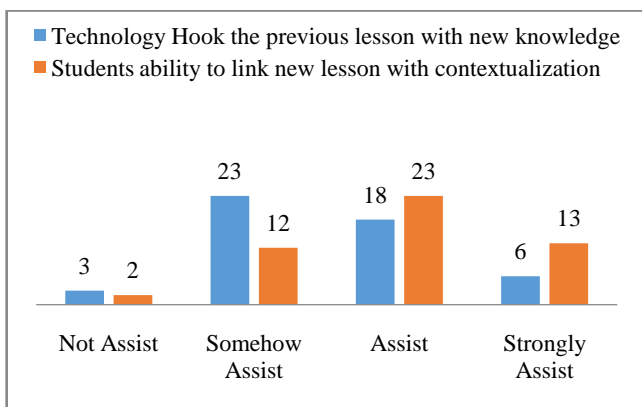
SOURCE: Field Data; 2019

3.2.2 Accessing Web Open Education Resources to Students' Performance

Use of Web Open Education Resources (OERs) enabled lesson notes to possess multi-facet skills and knowledge, covers subjects' syllabus knowledge gap therefore are potential for students, teachers, teaching and learning activities and outcomes. Respondents agreed open education resources are accessible; first track assistive before actual classroom exposition though content preparation and organization is time consuming than in traditional mode. Quantitative findings for teachers' web open education resources accessibility to students' performance were ranked:

18% not assist, 28% somehow assists, 30% assist and 24% strongly assist as presented in pie chart 3.1.

Pie Chart 3.1: Accessing Web Open Education Resources (n=50)
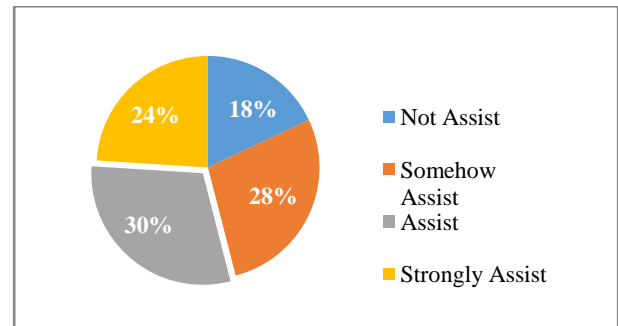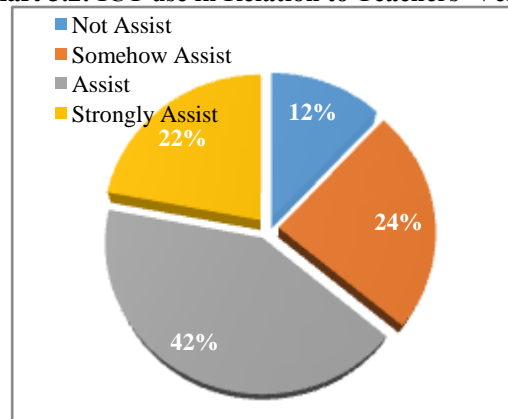

SOURCE: Field Data; 2019

The interview schedule guided with item *"What are your opinions on use of web open education resources (OERs) to students' performances?"* Respondents expressed:

> "Sincerely it is time consuming to sort-out web open education resources; it needs teachers to encompass exploration and navigation skills, to be familiar with different useful educational websites; needs teachers to hold skills for scanning and skimming knowledge content to fasten accept useful and reject not useful subject lesson contents to overcome exposing students beyond curriculum requirements; this experience is different from traditional mode where everything is set-up from single subject text-book."

3.2.3 Level of Verbalism

In classroom teaching and learning teachers are obliged to translate curriculum content into instructional activities; Teachers' ability to use ICT for lesson delivering was measured by levels of verbalism and students involvements in various lesson development stages. Findings for teachers' verbalism level during lesson delivering ranked: 9 somehow assisting (18%), 24 assist (48%) and 17 strongly assist (34%) as presented in pie chart 3.2.

Pie Chart 3.2: ICT use in Relation to Teachers' Verbalism
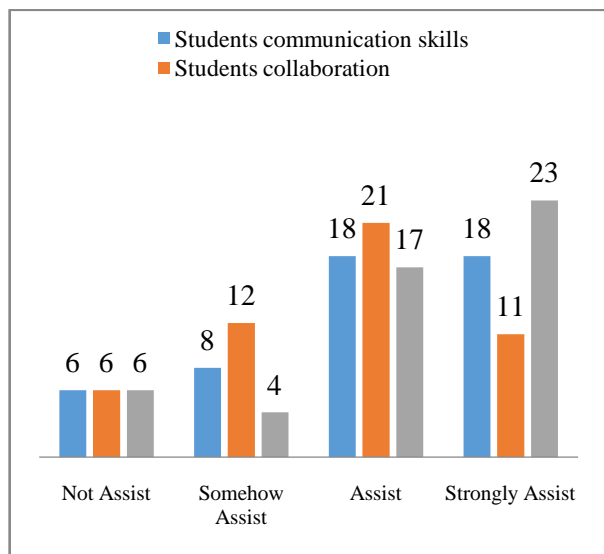

SOURCE: Field Data; 2019

Interview session was guided with the question *"How do you compare level of verbalism in ICT mediated and traditional approaches in lesson delivering?"* Respondents mentioned:

"I observed Biology subject teacher instructing on function of heart; In traditional modality approaches the teacher utilized physical modals and hand drawings showing heart blood circulation and heart-beats mechanisms with a lot of oral words leading students' imagination and cramming; when the same content was delivered through technology mediation, simulations and animations changed learning situation and students easily understood concepts at the same time teacher used few words to express many content."

3.2.4 Students' Communication, Collaboration and Team Working

Communication is a key functional activity performed by teachers and students in classroom set up regardless traditional or ICTs mediated teaching and learning; it takes place between teacher and students or among students themselves. It is through action of communication when collaboration and teamwork emerged. The use of ICT for students communication showed: 18 strongly assists (36%), 18 assist (36%), 8 somehow assist (16%) and 6 not assisting (12%) as presented in bar chart 3.3; descriptive findings presented 2.96 mean and 3 median implying more than average of respondents agreed ICTs use in classroom activities enable students to communicate.

Bar Chart 3.3: Use of ICTs for Students' Communication, Collaboration and Team Working (n=50)

SOURCE: Field Data; 2019

Further findings on use of ICTs in assisting students to create teamwork pressed: 6 not assist (12%), 4 somehow assist (8%), 17 assist (34%) and 23 strongly assist (46%); while for collaboration presented: 6 not assist (12%), 12 somehow assist (24%), 21 assist (42%) and 11 strongly assist (2%), as depicted in bar chart 4.7. These findings proved positive

relationship between students' communication to team working while there is low level of collaboration due to rules, regulations and procedures for students to follow in accessing ICTs devices.

In another hand interview session findings was guided with the question *"How does students communicate, collaborate and create team working in the classroom using ICTs?"* The respondents declared:

"In the classroom I observed students communicate vaguely without guidance of teacher, interfered other students' concentration and may even disrupt all classroom activities; ICTs does not remove teachers in their position of managing classroom proceedings."

"Team working and collaboration are key for students to share knowledge they hold in mind; teachers are obliged to plan for leading activities popping up these attributes to students and make sure are practiced because are among basic skills required for 21st century advocated knowledge economy."

3.2.5 Students' Concentration in Lesson Delivering encompasses ICTs

Level of students' concentration during ICTs mediated lesson delivering proved: 54% strongly assist (27), 38% assist (19) and remained 8% somehow assist (4) as presented in pie chart 3.3; descriptive statistics shown 3.46 mean, 4 median, standard deviation of 0.646 and 0.416 variance, implied students' concentration in classroom mediated with ICT during lesson delivering is high.

Pie chart 3.3: Use of ICTs for Students' Concentration (n=50)
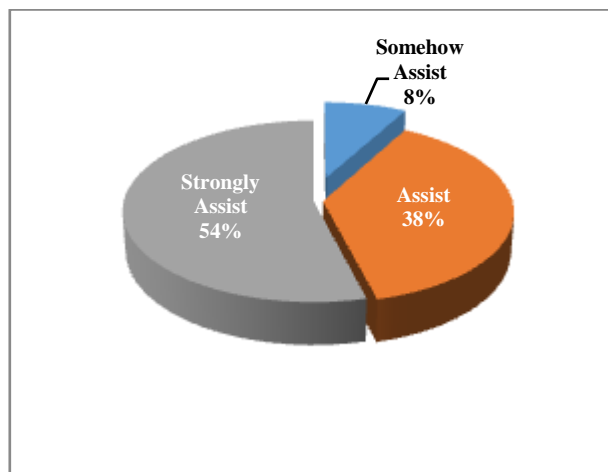
SOURCE: Field Data; 2019

The interview schedule was lead by item *"How does ICTs facilitate students' concentration during subject lesson content delivering?"* Findings postulated dilemmatic as either students are worried to lag behind due to speed or language accent encompassed or are interested to lessons because tools used possessed funny components as narrated:

"My opinions are on kind of English language accents used in videos incorporated in subject lesson contents which was delivered in classrooms; the videos possessed either Indian or American accents which does not match with students language capturing ability; one could think students are concentrating in lesson delivering but in actual sense it might be are struggling to capture what is presented and are gone astray. Teachers are supposed to mute and edit language voice background to incorporate familiar language accents for students' better understanding."

Further another item on *"What are your opinions on ICTs to enable students' concentration during subject lesson content delivering?"* Was posed and respondents expressed:

"Use of videos, simulations, models, animations, pictures and sounds in a well designed PowerPoint presentations inspired and attracted students minds into classroom; all the time during classroom teaching and learning activities students were tentatively to work, follow and perform what has been asked; students became anxiously to see what next."

3.2.6 Students' Lesson Engagement and Knowledge Creation

Quantitative findings on students' engagement in lesson activities illustrated 3.46 mean, 4 median, with 0.646 standard deviation and 0.417 variance while level of students knowledge creation is below with 2.20 mean, 2 Median, and high deviation from mean of 0.904 standard deviation and 0 .816 variance. However respondents' findings on attribute of ICTs assistance to students' lesson engagement devoted: 54% strongly assist (27), 38% assist (19) and 8% somehow assist (4). Further findings on level of students knowledge creation ranked: 8% strongly assist (4), 28% assist (14), 40% somehow assist (20) and 24% not assist (12) as presented in Pie Chart 3.4

Pie Chart 3.4: Student's Lesson Engagement and Knowledge Creation (n=50)
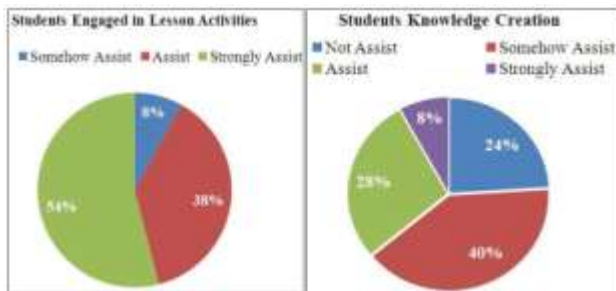
SOURCE: Field Data; 2019

Interview discussion was guided with the question "*How does students' engaged in ICT lesson delivering mode relatively to traditional teaching mode?*" The respondents declared:

"Teaching and learning activities using ICTs involved and engaged students from beginning to the end of lesson. Group and paired discussion was observed; individual students were tentatively listening, make follow up and attempt to undertake learning tasks assigned by teachers."

Another interview question posed was: *"What are your observations on teachers to lead students into subject lesson engagement and content creations?"* respondents' expressed gaps in these attributes as revealed:

"Students are minimally involved in knowledge creation due to limited number of computers and time for technology practices; they were not exploring lesson content from different web sources; they continue to depend on what had already been prepared by teachers nothing changed."

*3.2.7 Teachers' ability to fit Content, Pedagogy and Technology*

Qualitative interview findings were obtained guided with the question *"How do you assess teachers' ability to fit content, pedagogy and technology?"* signified:

"It is through practice teachers get competencies to use ICTs integrative with pedagogy and content to bring efficiency and effectiveness in classroom activities, teachers did not show up big changes when using traditional and technology mediated teaching and learning activities despite of trying to incorporate some tools in the delivered lesson contents."

"Efforts should be done to assist teachers to continue gaining skills and knowledge to fit contents, pedagogy and technology; other teachers think incorporation of videos, simulations and animations are replacing them and stand aside to observe what is going on like students did."

In addition, quantitative findings for teachers' ability to fit content, pedagogy and technology demonstrated: 7 not able (14%), 22 somehow able (44%), 15 able (30%) and 6 strongly able (12%) as illustrated in pie chart 3.5

Pie Chart 3.5: Teachers' Ability to fit Content, Pedagogy and Technology (n=50)
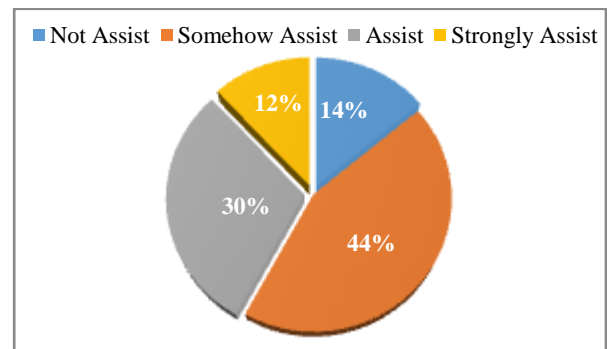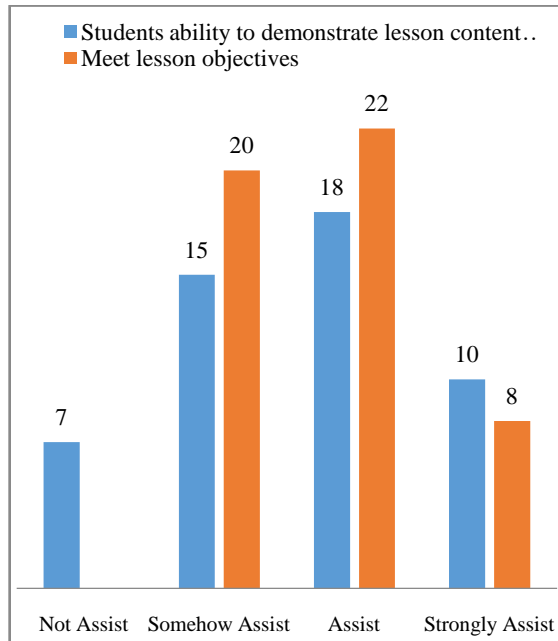

SOURCE: Field Data; 2019

3.3 Students' Ability to Demonstrate Feedback to Lesson Objectives

Lesson feedback enabled teachers get to know gap(s) in student's schemas on accommodated new knowledge against

lesson objectives. The responses on student's worksheets after ICTs mediated teaching and learning declared: 7 not assist (14%), 15 somehow assist (30%), 18 assist (36%) and 10 strongly assist (20 %). Moreover findings on teachers' aptitude to meet lesson objectives in ICT mediated classroom illustrated: 20 somehow assist (40%), 22 assist (44%) and 8 strongly assist (16%) as presented in bar chart 3.4.

Bar Chart 3.4: Students Ability to Demonstrate Feedback to Lesson Objectives (n=50)

SOURCE: Field Data; 2019

IV. CONCLUSION

4.1 Use of ICTs for lesson Preparation to Students' Performance

The findings proved teachers viewed ICTs is assistive for preparing subjects lesson especially in hooking, contextualization and access to Web Open Education Resources (OERs) and incorporation of illustrative tools such as videos, animations, simulations, pictures and other multi e-content resources which saves lesson delivering time compared to traditional approaches whereby teachers had to draw 'imaginative' content diagrams and illustration on chalkboards and drive lesson content from single textbooks. Teachers needs to possess skills, knowledge and competencies for exploring, reading, scanning, skimming and filtering content fitting lesson requirements though these predefined procedure and approaches are time consumes.

4.2 Use of ICTs for Lesson delivering to Students' Performance

Levels of verbalism in ICTs mediated classrooms are replaced with use of simulations, illustrations, videos, animations and all sort of enriched complimentary lesson content tools assisting to make interactive instruction than is in traditional

mode where contents presentations are abstract, emphasize cramming therefore students knowledge transferred in short term memory. There are highly communication level and teamwork among teachers and students in pairs and groups therefore greenlining collaboration. There are rules, regulations and procedures hindered students accessing technology in and out of classroom therefore less knowledge creating. Teachers are obliged for continually managing classroom proceedings to avoid vague.

There are high level of students concentration to lesson activities though videos incorporated in lesson content had language accents frustrates students therefore need editing. Concentrations enabled students to engage in learning process from the beginning to the end. Teachers use probe leading activities to make students focused.

4.3 Use of ICTs for Students' feedback to Lesson Objectives

Students' worksheets presented feedbacks in relation to lesson objectives enable identifying knowledge accommodation gaps and eradicate accordingly. Continuous teachers' practices assist to become competent in classroom activities incorporated with ICTs though other efforts such as trainings are still required until are managed to merge technology, pedagogy, content and knowledge.

RECOMMENDATIONS

Study recommendations are presented basing to findings:

a) Community particularly parents should accept technology as new learning tools due to its potentialities to students in classroom learning performances; therefore are obliged to procure gadgets and devices for their children.

b) Teachers as school subjects continuously practice use of technologies in classroom activities until became competent and confidence in merging technology, content, pedagogy and knowledge. Classroom technology mediating practices doesn't replace teachers' roles but are complimentary supportive tools.

c) Ministry of Education, Science, Technology and Vocational Training (MoEST) collaboratively with Presidents' Office Regional Administration and Local Government (PO-RALG) had to eradicate rules and regulations prohibiting students learning with on hand gadgets at the same time find better ways for students to utilize technologies without being distorted social-culturally.

REFERENCES

[1]. Chai, C. S., Koh, J. H. L., & Tsai, C.C. (2011). Exploring the Factor Structure of the Constructs of Technological, Pedagogical, Content and Knowledge (TPACK). *The Asia-Pacific Education Research*, *20*(3), 595–603.*Technology* vol. 8, no. 2, pp. 20-32.

[2]. EngestrÖm, Y. (2008). Enriching Activity Theory without Shortcuts. **Inter-Acting with Computers, 20, pp. 256-259.** Visited on 5 March, 2019 at http://dx.doi.org/10.1016/j.intcom in *Australasian Journal of Educational Technology*, vol. 25, no. 3, pp. 399-420.

[3]. Hattie, J. (2009). **Visible Learning**. Abingdon: Routledge.

[4]. Kozma, R. B. (2005). National Policies that Connect ICT-Based Education Reform to Economic and Social Development. *An Interdisciplinary Journal on Humans in ICT Environments,* **1(2), pp. 117-156.**

[5]. Lu, Z., Hou, L and Huang, X., (2010). A Research on a Student-Centered Teaching Model in an ICT based English Audio-Video Speaking Class*. International Journal of Education and Development using Information and Communication Technology,* **vol. 6, pp.101-123.**

[6]. Mumtaz, S. (2000). Factors affecting teacher's use of information and communications technology: A review of the literature. *Journal of Information Technology for Teacher Education,* **9(3), pp. 319-341.**

[7]. Sanga, C.; Magesa, M.M. ; Chingonikaya, E. and Kayunze; K.A.(2013). Can e-learning promote participation of female students in STEM disciplines in higher learning institutions of Tanzania? *International Journal of Education and Development using Information and Communication Technology* **(IJEDICT), Vol. 9, Issue 3, pp. 86-102.**

[8]. Sedoyeka, E., & Gafufen, G.(2013). Computers in Tanzania Secondary Schools-Challenges and Opportunities. *International Journal of Computing & ICT Research,* **7(1). pp 22-32.**

[9]. Shahadat H. K., Mahbub H., Che K. C. (2012). Barriers to the Introduction of ICT into Education in Developing Countries: The example of Bangladesh", *International Journal of Instruction* **Vol.5, No.2 e-ISSN: 1308-1470, retrieved in 2nd February, 2009 from www.e-iji.net ISSN: 1694-609X**

[10]. United Republic of Tanzania. (1999). **Education and Training Policy.** Dar es Salaam: Ministry of Education Vocational and Training. Retrieved on 11th March, 2019 from http://www.moe.go.tz/pdf/Moec

[11]. United Republic of Tanzania. (2014). **Education and Training Policy.** Dar es Salaam: Ministry of Education Vocational and Training. Retrieved on 18th March, 2019 from http://www.moe.go.tz/pdf/MoEVT

[12]. Vygotsky, L.S. (1978). **Mind in Society: The Development of Higher Psychological Processes.** Cambridge, MA: Harvard University Press.