

# Portable Technologies in Collaborative Learning

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## ABSTRACT

Portable technologies offer new opportunities for collaboration learning. It is shifting learning process from pedagogy to cybergogy. Cybergogy focuses on helping adults and young people to learn in a virtual world by promoting and technologically allowing autonomous and interactive learning based on learners. The study established that 50.6% of variation in collaborative learning in basic education was accounted for by portable technologies. The portable technology framework for collaborative learning (PTFCL) so developed showed the critical indicators to enhance collaborative learning. The findings of this study would inform stakeholders on how one could measure the level of ICT integration for collaborative learning in basic education.

**Keywords:** Collaborative learning, ICT Integration, Portable technologies, Digital devices

## I. INTRODUCTION

According to Traxler and Kukulska-Hulme (2016) portable devices are also referred to as mobile devices. Mobile devices have made up a technological platform for enhancing collaborative learning. Some of such mobile devices are laptops, smart phones, tablets and wearable devices. Portable technologies collaborative learning incorporates mobility as a key and breakthrough requirement and ubiquity, pervasiveness, personalization, flexibility currently being brought in by wide spread of mobile devices and wireless technologies.

A study done by Halili on teaching and learning in the fourth industrial revolution reinforced redesigning of the learning spaces utilizing collaborative tables and smartboard and employing varied education processes such as heutagogy, peeragogy, and cybergogy (Halili, 2019).

Cybergogy focuses on helping adults and young people to learn in a virtual world by promoting and technologically allowing autonomous and interactive learning based on learners. The current study focuses on learning by promoting independent and collaborative learning in a virtual world, technologically allowing learner-centered learning.

According to Grabe and Grabe (2001), in teaching, the aspects that were considered to be more important to teachers while using ICT were: making lessons more engaging, easier, more exciting for them and their pupils, more varied, more inspiring and enjoyable for the pupils. Researchers established that computers enhance teaching and learning by offering resources for practice and study, and by providing greater access to re-learning.

The One Laptop per Child (OLPC) project was established and used by UNESCO as a means of closing the digital divide in the usage of ICT between developed and developing nations. Although this action as a top educational priority occupied the front pages of a variety of international organizations and countries, the real implementation and operation of this OLPC initiative did not achieve significant

results, especially in the less developed countries (Ames, 2010).

There are nations that have adopted criteria for introducing technologies into the classroom to improve learning capabilities for learners and to train them for the 21st century and beyond. Countries use ICT skills to teach their learners real-world technologies. In their classrooms, countries such as Norway and New Zealand have introduced classroom systems that enable learners in the globalized world to become adequate in 'information literacy' and 'internet literacy.' Norway provides an example of detailed criteria where, for example, a 10-year-old can use 3D imaging tools to create simple houses in an art class (Bakia, 2011)

Ally (2009), pointed out that people around the world, currently, would choose to access materials for learning on their mobile devices more than just access materials for learning obtaining from acquiring another technology. As a consequence, on various types of mobile devices, educators and trainers must develop learning materials for distribution. Similarly, mobile technology will be used by nomadic pupils and staff.

By connecting learners to smart technology, facilitating learning apps on every mobile device, the right wireless network is a core component of new learning experiences. More than 90% of schools in New Zealand use wireless networking (Wi-Fi) to connect to the internet to find out what your child means. By the end of 2016, all schools will have the infrastructure available to provide teaching and learning with high-quality, easy internet connectivity. This allows wireless technology, cloud-based apps and portable technology use in the classrooms and provides our learners with wealth of online data, applications and links to global knowledge to improve learning (Santhi1 & Senthil, 2009).

In America's classrooms, the remarkable speed of the transition to learning using digital devices has made it impossible for training programs for teachers to keep ahead of the curve. The ubiquity of broadband greatly enhances

learning opportunities and in-service teachers' professional learning opportunities (South & Stevens, 2016). According to Bornman (2016) and Asongu and Le Roux (2017), ICT resources have been found not only relevant to teachers, but also encourages learners in their day to day learning activities. Also ICT help in improving fluency, writing skills, originality, versatility and elaboration, according to UNESCO (2015). The results of Asongu and LeRoux (2017) indicated that digital device use enhances learners interest in learning and research. A comparable study conducted in Kenya by Tarus, Gichoya, and Muumbo (2015) indicated how digital devices enabled learners to share their work with individuals outside or within the school.

Cell phone use was widely embraced in Africa between 2006 and 2011 and by the end of 2012, there were an estimated 735. Such advances have enabled the embracing of mobile phones in open and distance learning. A variety of countries are implementing M-learning projects, with the largest number of projects being implemented in Uganda, South Africa and Kenya. One of the outstanding projects was in Tanzania, which allowed teachers to use mobile technology to provide digital video screening in class (Isaacs 2012).

In Kilgoris, Narok County, Kenya, technology has born some fruit in primary schools where learners access all library books through kindles (small PC gadgets) (Manduku, Kosgey, & Sang, n.d). Internet technologies allow digital content to be widely distributed to several users simultaneously, anytime and anywhere. When designed to serve the learning environment, wireless technology allows for increased connectivity and enhanced classroom collaboration (Kyalo & Nzuki, 2014).

In terms of mobile apps and utilities, Kenya has a leadership role. This place of leadership is primarily due to developments in mobile money transfer services. Kenya is actually one of the most linked countries on Africa's Eastern Coast. Cell phones are the most used and available ICT infrastructure in Kenya. There is, however, an opportunity to expand on this position of leadership and become a leader in educational applications and services (GoK, 2013).

## II. FINDINGS, INTERPRETATION AND DISCUSSION

The study sought to establish the indicators of portable technologies for collaborative learning in basic education in terms of portable technologies used in Schools and statistical relationship between Portable technologies and collaborative learning.

**Table 1: Portable Technologies Used in Schools**

Portable Technologies	Frequency/ percentage					Mean Rate
	1	2	3	4	5	
Digital devices are frequently used in learning in my class	95(20.5)	132(28.4)	26(5.6)	191(41.2)	20(4.3)	2.8

Adequate technical support is provided in using ICT devices in learning in my school.	133(28.7)	136(29.3)	36(7.8)	125(26.9)	34(7.3)	2.5
Pupils have a positive attitude toward using digital devices in learning in my class.	36(7.8)	40(8.6)	36(7.8)	199(42.9)	153(33.0)	3.8
When I incorporating digital tools in my class it leads to positive academic results for my learners.	41(8.8)	44(9.5)	38(8.2)	203(43.8)	138(29.7)	3.8
My School has installed Internet technologies to permit sharing of digital content	213(45.9)	116(25.0)	56(12.1)	60(12.9)	19(4.1)	2.0
Relevant Digital content is available for use in our school for learning	109(23.5)	105(22.6)	47(10.1)	35.8	37(8.0)	2.8
Development of curriculum materials for ICT in education is critical as an effort to integrate ICT into regular learning in classrooms	50(10.8)	63(13.6)	43(9.3)	195(42.0)	113(24.4)	3.6
In my class learners share different forms of digital media, such as photos, audio or text, as part of their learning activity	105(22.6)	133(28.7)	45(9.7)	156(33.6)	25(5.4)	2.7

### Source: Research data (2019)

From table 1 the findings reveal that Digital devices were frequently used in learning in class as indicated by the respondents rating of 2.8 which was above average rating on a scale of 1 to 5 where 1 being the lowest rating and 5 the highest rating. 211 (45.5%) of the respondents agreed that Digital devices were frequently used in class for learning.

Concerning Adequate technical support being provided in using ICT devices in learning in school, the respondents rating was 2.5 which was an average rating. 159(34.3%) of the respondents agreed that there was technical support provided in using ICT devices in learning.

The findings also indicated that Pupils had a positive attitude toward using digital devices in learning. The respondents rating was 3.8 which was highly rated. 352(75.9%) of the respondents agreed that Pupils had a positive attitude toward using digital devices in learning.

The findings also established that When incorporating digital tools in class it led to positive academic results for learners. The respondents rating was 3.8 which was highly rated. 341(73.5%) of the respondents agreed that incorporating digital tools in class led to positive academic results for learners.

The findings also established that Relevant Digital content was available for use in schools for learning. The respondents

rating was 2.8 which was highly rated. 203(43.8) The findings also established that Schools have installed Internet technologies to permit sharing of digital content. The respondents rating was 2.0 which was lowly rated. 79(17%) of the respondents agreed that Schools have installed Internet technologies to permit sharing of digital content.

%) of the respondents agreed that Relevant Digital content was available for use in schools for learning.

The findings also established that Development of curriculum materials for ICT in education was critical as it was an effort to integrate ICT into regular learning in classrooms. The respondents rating was 3.6 which was highly rated. 308(66.4%) of the respondents agreed that Development of curriculum materials for ICT in education was critical as it was an effort to integrate ICT into regular learning in classrooms.

The findings also established that learners share different forms of digital media, such as photos, audio or text, as part of their learning activity in class. The respondents rating was 2.7 which was highly rated. 181(39.0%) of the respondents agreed that learners shared different forms of digital media, such as photos, audio or text, as part of their learning activity in class.

Multiple regression analysis was determined and the results were presented in Tables 2, 3 and 4

**Table 2: Coefficients of Determination of Indicators of Portable Technologies on Collaborative Learning in Basic Education**

R	R Square	Adjusted R Square	Std. Error of the Estimate
.712a	.506	.491	.86675

*a. Predictors: (Constant), Pupils have a positive attitude toward using digital devices in learning in my class., My School has installed Internet technologies to permit sharing of digital content , Teacher’s pedagogical orientation is a principal factor in using digital technology in the classroom, Digital devices are frequently used in learning in my class, In my class learners share different forms of digital media, such as photos, audio or text, as part of their learning activity, In my school Teachers believe that they have control over hardware technology., Development of curriculum materials for ICT in education is critical as an effort to integrate ICT into regular learning in classrooms, Adequate technical support is provided to teachers’ in using ICT devices in learning in my school., When I incorporating digital tools in my class it leads to positive academic results for my learners., Relevant Digital content is available for use in our school for learning, Teachers integrate Technology in learning when they are aware that some of their counterparts who adopted it are working successfully, In my school Teachers believe in the effectiveness of technology., In my class learners have appropriate ICT skills to enable them to develop their own learning strategies, In my school Adequate supervision support is provided by administration to Enable teachers integrate ICT in teaching-learning*

From Table 2 the coefficient of determination is 0.506 It shows that 50.6 of variation in Collaborative learning in Basic Education is accounted for by Portable Technologies. Analysis of Variance was done to establish the level of significance (Table 3).

**Table 3: Analysis of Variance of Indicators of Portable Technologies on Collaborative Learning in Basic Education**

	Sum of Squares	df	Mean Square	F	Sig.
Regression	346.079	14	24.720	32.905	.000b
Residual	337.316	449	.751		
Total	683.394	463			

*a. Dependent Variable: Collaborative learning.*

*b. Predictors: (Constant), Pupils have a positive attitude toward using digital devices in learning in my class., My School has installed Internet technologies to permit sharing of digital content , Teacher’s pedagogical orientation is a principal factor in using digital technology in the classroom, Digital devices are frequently used in learning in my class, In my class learners share different forms of digital media, such as photos, audio or text, as part of their learning activity, In my school Teachers believe that they have control over hardware technology., Development of curriculum materials for ICT in education is critical as an effort to integrate ICT into regular learning in classrooms, Adequate technical support is provided to teachers’ in using ICT devices in learning in my school., When I incorporating digital tools in my class it leads to positive academic results for my learners., Relevant Digital content is available for use in our school for learning, Teachers integrate Technology in learning when they are aware that some of their counterparts who adopted it are working successfully, In my school Teachers believe in the effectiveness of technology., In my class learners have appropriate ICT skills to enable them to develop their own learning strategies, In my school Adequate supervision support is provided by administration to Enable teachers integrate ICT in teaching-learning*

From Table 3 the level of significance was 0.000 which was less than the set p-value of 0.05. This meant that portable Technologies were predictors of Collaborative learning in Basic Education. To determine the influence of portable Technologies on Collaborative learning in Basic Education multiple regression analysis was done and the results were as shown in Table 4.

**Table 4: Results of Regression Analysis Between Indicators of Portable Technologies On Collaborative Learning in Basic Education**

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.007	.185		.035	.972
Digital devices are frequently used in learning in my class X1	.146	.038	.155	3.891	.000
Adequate technical support is provided to teachers' in using ICT devices in learning in my school X2	-.015	.038	-.017	-.396	.692
Pupils have a positive attitude toward using digital devices in learning in my class X3	-.155	.042	-.152	-3.675	.000
When I incorporating digital tools in my class it leads to positive academic results for my learners.	.024	.040	.024	.599	.549
My School has installed Internet technologies to permit sharing of digital content X4	.021	.042	.020	.491	.624
Relevant Digital content is available for use in our school for learning X5	.037	.037	.041	1.006	.315
Development of curriculum materials for ICT in education is critical as an effort to integrate ICT into regular learning in classrooms X6	.035	.039	.038	.906	.366
In my class learners share different forms of digital media, such as photos, audio or text, as part of their learning activity X7	.085	.037	.090	2.318	.021
Teachers integrate Technology in learning when they are aware that some of their counterparts who adopted it are working successfully X8	.165	.042	.169	3.890	.000
In my class learners have appropriate ICT skills to enable them to develop their own learning strategies X9	.350	.042	.362	8.242	.000
In my school Teachers believe in the effectiveness of technology. X10	-.041	.042	-.042	-.985	.325
In my school Teachers believe that they have control over hardware technology. X11	-.011	.040	-.012	-.275	.784
Teacher's pedagogical orientation is a principal factor in using digital technology in the classroom X12	.156	.039	.165	4.012	.000
In my school Adequate supervision support is provided by administration to Enable teachers integrate ICT in teaching-learning X13	.138	.039	.155	3.525	.000

a. Dependent Variable: Collaborative learning.

$$\text{Collaborative learning} = 0.007 + .146X1 - .155X3 + .085X7 + .165X8 + .350X9 + .156X12 + .138X13$$

A multiple regression was calculated to predict Collaborative learning based on Portable Technologies.

Digital devices are frequently used in learning (X1), Pupils having positive attitude toward using digital devices in learning (X3), learners sharing different forms of digital media, such as photos, audio or text, as part of their learning activity(X7), Teachers being aware that some of their counterparts who adopted Integration of ICT in learning is

working successfully(X8), learners having appropriate ICT skills to enable them to develop their own learning strategies(X9), Teacher's pedagogical orientation in using digital technology in the classroom (X12) and adequate supervision support provided by administration to Enable teachers integrate ICT in teaching-learning (X13) contributed positively to Collaborative learning.

Based on the model developed, one can measure collaborative learning by substituting in the formula for indicators of portable technologies:

$$\begin{aligned} \text{Collaborative learning} &= 0.007 + 0.146 * 5 - \\ &0.155 * 5 + 0.085 * 5 + 0.165 * 5 + 0.35 * 5 + 0.156 * 5 + 0.138 * 5 \\ &= 4.432 \end{aligned}$$

If all conditions are perfect, then Collaborative learning will be rated 4.432 out of maximum rating of 5. This will translate into 88.64%

The lowest rating

$$\begin{aligned} \text{Collaborative learning} &= 0.007 + 0.146 * 1 - \\ &0.155 * 1 + 0.085 * 1 + 0.165 * 1 + 0.35 * 1 + 0.156 * 1 + 0.138 * 1 \\ &= 0.892 \end{aligned}$$

The worst case scenario, then Collaborative learning will be rated 0.892 out of maximum rating of 5. This will translate into 17.84%.

It can also be presented as follows.

The scale is presented in Figure 1.

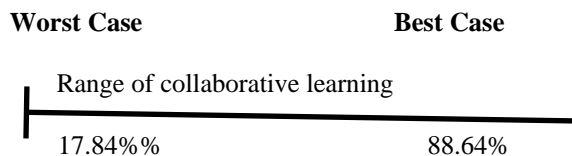
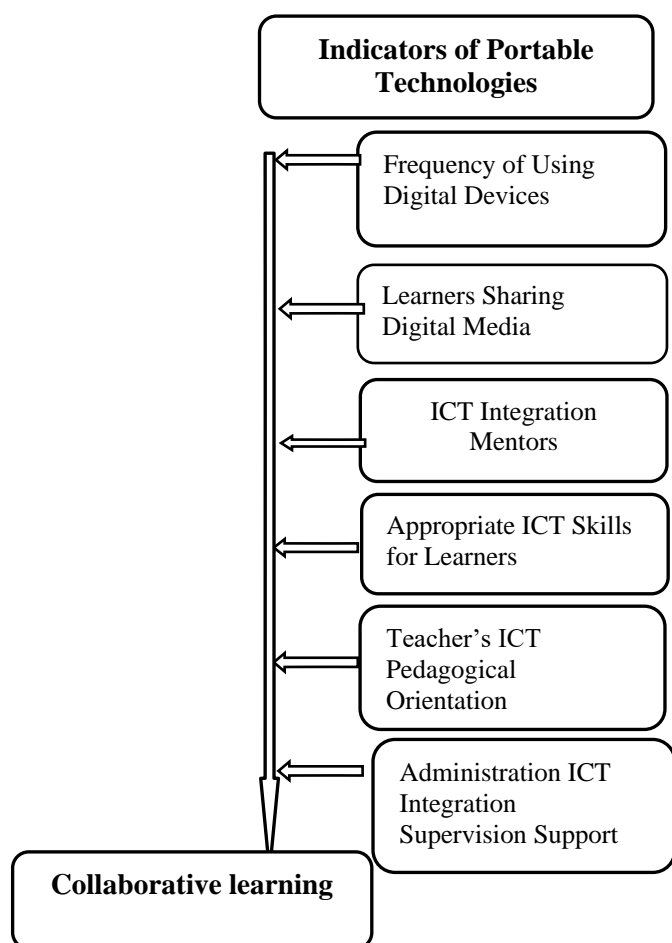


Fig 1



**PORTABLE TECHNOLOGIES FRAMEWORK FOR COLLABORATIVE LEARNING (PTFCL)**



With regard to Indicators of Portable technologies, Adequate technical support need to be provided in using ICT devices in learning in school to enable frequent use of digital devices. There is also need for learners to have appropriate ICT skills to enable them to develop their own learning strategies. It is important for teachers to be made aware of their counterparts who have adopted ICT Integration in the classroom. This is important since ICT integration to be successful there is need to develop ICT mentors as this would enhance adoption of ICT in learning.

**III. CONCLUSION**

The findings show that that 50.6% of variation in Collaborative learning in Basic Education is accounted for by portable Technologies. Digital devices frequently being used in learning in class, Adequate technical support provided to teachers' in using ICT devices in learning in school, incorporating digital tools in class, Development of curriculum materials for ICT in

education was critical as an effort to integrate ICT into regular learning in classrooms and learners sharing different forms of digital media, such as photos, audio or text, as part of their learning activity contributed positively to Collaborative learning.

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