

# Perceived Benefits of Technology Enhanced Learning by Learners in Uganda: Three Band Benefits

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**Abstract**—Mobile learning (m-learning) is steadily growing and has undoubtedly derived benefits to learners and tutors in different learning environments. This paper investigates the variation in benefits derived from enhanced classroom learning through use of m-learning platforms in the context of a developing country owing to the fact that it is still in its initial stages. The study focused on how basic technology-enhanced pedagogic innovation like cell phone-based learning is enhancing classroom learning from the learners' perspective. The paper explicitly indicates the opportunities presented by enhanced learning to a conventional learning environment like a physical classroom. The findings were obtained through a survey of two universities in Uganda in which data was quantitatively collected, analyzed and presented in a three banded diagram depicting the variation in the obtainable benefits. Learners indicated that a smartphone is the most commonly used device. Learners also indicate that straight lectures, student to student plus student to lecturer communication, accessing learning material and assignments are core activities. In a TEL environment support by smartphones, learners indicated that they conveniently achieve the prior activities plus discussions and group work. Learners seemed not attracted to the possibility of using TEL environment to take lectures, as well as make class presentations. The less attractiveness of these two factors may be due to the teacher centered approach commonly applied in the country's education system.

**Keywords**—Technology enhanced learning, mobile learning classroom learning, perceived benefits.

## I. INTRODUCTION

THE ever increasing interest in using technology for learning has influenced the development of methods and frameworks for enhanced learning as a way to building appreciation of the involved benefits, as well as averts the refusal of these resources. Although the use of technology has received greater acceptance in higher education, a lot needs to be learned in order to appreciate its contribution in education [1]. Additionally, [1] indicated that the methods used by academicians to conceptualize technology with learning and teaching significantly affects the learning experience of students. In some cases among developing countries, the benefits that are derived from m-learning through cell phones are not as yet appreciated. This can be derived from the fact that using mobile phones in schools has been prohibited by the

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ministry of Education and Sports in Uganda for example as [2] found. This is not a newly discovered challenge to m-learning because [3] also indicated that several colleges were against the use of cell phones on their grounds. In agreement, [4] states that the teaching staff at universities still battle with when to allow cell phone access in the classroom, yet students are already mingling through the very same technology. In their arguments for mobile technology, [5] predict that students will be allowed controlled use of cell phones and restricted access to networks in classrooms which will in turn support students in team working and collaborative learning efforts. At the same time, [5] instigated that mobile technology would create a conflict as schools prohibit the use of modern technologies for individualized learning while toiling to provide obsolete computing devices that students are forced to learn which propagates an obsolete model of content delivery and instructive teaching. Technology enhanced learning (TEL) emerges as an appropriate way for student centered learning with a high interactive learning environment. However, the situation is not perceived as such due to the complexity of the TEL recommendations as [6] reflect. To breakdown the complexity in TEL recommendations with particular focus on the derived benefits, we focused on the situation in a developing society and present an abridged exposition of the arising benefits.

### A. Aim of the Study

The study investigated the perceived benefits of TEL by learners in developing countries. We studied learners taking different courses in higher institutions of learning.

## II. LITERATURE REVIEW

### A. TEL

The use of available and appropriate technology for learning, teaching and assessment is what we take as TEL, since the term was quite supported by [7], [8] in a similar regard. There are a number of features that reflect TEL as discussed by [9], [10]. In this paper, the areas of focus in studying TEL relates to portable device usage like mobile phones and tablets, social interactivity and connectivity supported by wireless technologies such as 3G and 4G Wi-Fi, which are commonly visualized and understood in developing countries.

TEL has not as yet received extensive studies and as thus generally presented benefits seem to remain ambiguously understood and hence perceived as impracticable in the case of developing countries. The benefits of TEL for developing countries have not been directly envisaged, hence leading to

the refusal of cell phone use in learning, as [11] pointed out a case in point. Studies to analyze and provide an understating of TEL are almost generalized with electronic learning (e-learning) points of focus without explicitly outlining this embedded outcome. Generally, [11] indicate that e-learning creates an occasion that alters the paradigm of distance learning to a more learner centric with more emphasis on discussion learning. The continued use of printed learning material and technologies for broadcasting is dominant in least developed countries as shown by [11] manifests as an outcome of hidden benefits that can be derived.

### *B. TEL Case - M-Learning*

M-learning can support tutoring through providing services that support learning and teaching. M-learning can support tutoring through providing services that support learning and teaching in any learning environment [12] in or out of a classroom. M-learning takes learning to a whole new exciting and less expensive level compared to desktop computers or laptops. Exciting to the level of having students giving answers to all the questions asked in class without flinching using their Internet enabled cell phones that use a Wireless Application Protocol (WAP) browser. M-learning has the potential to grow and exceed expectation and it engages learning, as well as empowers both students and tutors alike as [13] also noted. Given the prevailing learning environment commonly applied in developing countries, the most important m-learning service could be to support teaching inside the classroom, generation of content for students by tutors and the possibility of students viewing their final graded results. However, m-learning is still in its experimental stages and according to [13] there is not much empirical evidence on it, unlike e-learning. It is stated that m-learning can in no way replace traditional learning but it should provide a supporting base to learning and education-related tasks [14]. Additionally, m-learning contributes highly to pulling young people towards learning, sustaining their interest and supporting their learning and development [15].

According to [15], m-learning encourages both independent and collaborative learning experiences, as it provides the opportunity of working independently of a group setting and supports collaborative work in a classroom setting. The former is preferred for the shy and also the busy students, while the latter is good for classroom sessions where students need to learn from each other. M-learning encourages engaged learning where students are active participants in learning activities [15]. M-learning reduces the need for the use of secondary learning material (such as coursework deadlines, test schedules), education is improved through the reduction of time and the effort that one spends on knowledge acquisition [12]. Moreover, M-learning is an opportunity for instructors to set the level of integration of student learning into their real lives. In this way, tutors find ways to make the school walls seem the feigned paradigm they are [16].

### *C. Critique of the of Current m-Learning Applications towards Classroom Learning Enhancement*

Reference [17] postulates three classroom m-learning applications that have been re-applied countless times before. They identify a few avenues for use of m-learning in the classroom as well as the possibility of enhancement. They have been under study by several researchers and each is concisely described here as:

#### 1. Classroom Response Systems

Scholar [17] further uses the modest of explanations suggesting that in class interaction and learning allows teachers to ask short quiz like questions that introduce students to precise responses and anonymously send their responses through handheld response units and the system immediately cumulates every student's response. The responses are presented in an articulate form at the teacher's machine after aggregation usually through a histogram. Then students and their instructor share the visualization of responses, observe patterns in varying answers and use this as a window into a thorough learning discussion. Its importance in learning is the ability to monitor student's advancing comprehension of challenging domain notions. On the whole, technology's role is negligible, but of great value since it provides anonymity, promptness in response collection and enhances mutual pattern recognition in class responses though the tutor still bears the burden of teaching, elucidating and recapitulating [17]. Furthermore, [18] discovered that classroom response system technology, such as a class performance system can be effectively used by teachers in higher education for both instruction and assessment purposes, to stimulate peer and classroom education. However, it was also realized that the existence of correlations between classroom systems and the resulting sequel could not be determined by the classroom response system survey study carried out. Additionally, with these systems, teachers are expected to obtain professional training on how to bring on in-class interaction, discussion and learning in their teaching so as to make more use of this system while instructing classrooms. Furthermore this research did not allow for the determination of the impact that class response activities have on tutoring as well as learner knowledge acquisition and whether it enhanced learning or not [18]. It might also be expensive to implement and it might need maintenance which culminates into costs.

#### 2. Participatory Simulations

Participatory simulations are learning activities that improve teaching and learning where learners are actively involved in the replication of the flow of activities they have to learn about [19]. The study done was used to deduce that cell phones can be used to enable participatory simulation. This was through sending study materials and guidelines to learners through use of messaging services as well as physically tracking learners through instantaneous shadowing. It is a necessary for every learner to access a device and the proficiency to exchange data with fellow learners who emerge as proxies in learning processes where general events or

patterns result from the decisions and information communication is undertaken locally [20], [21]. Participatory models of learning drive students towards creation, designing and learning about a number of methodical occurrences that relate to the emerging proxies for information exchange in the learning processes. Reference [22] indicates that participatory models in learning lead learners to act out key parts in the ever emerging activities presented by the dynamism of the system. Participatory simulations are underpinned in the constructivist theory of learning using mobile technologies. Learners are largely advised to actively play significant roles as knowledge creators with mobile devices such as smart phones creating a realistic context and offering a source of support.

### 3. Collaborative Data Gathering

According to [17] this application requires investigations and enquires aimed at accumulating accurate findings obtained from ongoing experiments immediately so students' central point of attention is the elucidation of data. Additionally, [17] informs this research that these methods' actual usage in the mobile paradigm of classrooms has hardly been researched about. This explains their apparent lack of literature.

### 4. Short Message System Learning

The application of the short messaging service to promote classroom learning with particular focus to ubiquitous interaction through the use of mobile phones was proposed by [23]. In this research two tools were designed to lay the foundation for learning in and out of the class. Learners could forward text messages anonymously to tutors during class using their cell phones in the case of questions. In this way, tutors were made aware of the various questions at hand. The answers were provided at a more appropriate time without the interruption of the lecture schedule. Thereafter, an online discussion platform was made available in the event that learners wished to engage more on given aspects. In class and after class scenarios of SMS use were also studied and the results revealed that learners faced significant challenges relating to class distraction, although a number of them were keen on using SMS in class in the future [24].

Another research done by [25] entailed the use of messaging services for enhanced interaction between mentors and learners. The learners were expected to use the availed learning materials to study a given concept thereafter; the learner could insert questions for the mentor to respond to. The system was aimed at locating the most appropriate mentors to respond to the forwarded questions through the use of instant text messaging services. In the case of difficulties during learning, learners could forward questions to the teaching assistant (administrator) using the available mobile technologies. The teaching assistant was tasked to heuristically identify or match suitable mentors to the questions at hand. An increase in discussions and interactions was noted as the occurrences of questions forwarding and corresponding responses were absolutely more, as observed in the experiment, as compared to the online forum which had no mobile phones or the mentor mechanism. Additionally, [19]

also demonstrated that SMS text messages engage learners into participatory learning. Although class response systems, participatory simulations, collective data gathering and SMS learning have previously been used for learner engagement in classroom processes, the use of cell phones to enhance learning through individual and collaborative experiences within the classroom is yet to be explored.

### *D. Physical and Virtual Resources for M-Learning*

According to [26], 14 million Ugandans own a cell phone and that is 42% of the total population. The eminent success of m-learning can be owed to the increasing number of cell phone subscribers internationally. It is predicted by [27] that 3.2 billion people across the world are tapping into the opportunities presented by the Internet as at the end of year 2015 and that 2 billion of these reside in developing countries. With the significant number of people in the developing countries who are offline, an additional one billion subscribers are predicted by 2020, taking the global penetration rate to approximately 60% according to [28]. The growth in the number of mobile subscribers may indicate the growing base of user applications and the need to use mobile devices in our day to day lives.

M-learning devices are any technology that connects to wireless or cell phone networks and can access Web-based public or private services say iPods, iPads, smartphones, personal digital assistants (PDAs), netbooks, handheld gaming devices, cell phones, palmtops, and handheld computers are quite prominent and visible in the recent years and they are sophisticated enough to allow chatting, signing in to common social media platforms like Facebook and Twitter. New programs and application designs in social media by means of web 2.0 technologies and the semantic web 3.0 have made wireless devices more energetic, inescapable and also promise more learning potential [29]. It is asserted by [15] that hybrid cell phones also known as Smartphones have a bigger potential market and in fact they overtook sales in 2011, most probably because of their usability on the Internet. Cell phones, in this research, are a physical resource that provides a platform for m-learning, while the virtual resources entail the applications, mobile operating systems and networks that allow for the use of cell phones.

Mobile technology is more reasonably priced, learners are acquainted with it; and with proper instructional design it pledges educational opportunities with an increased flexibility for learners, satisfying the 'omnipresence' component of distance education for a myriad of learners [30]. According to [31], a single mobile device to a student facilitates the processing of word files, searching and retrieval of required information, analysis and assessment, computing, visible information processing with diversity in languages, as well as culture as a part of a conventional classroom. The learner in the digital age is mobile, and recent studies on mobile technology are focused on how mobile learners are supported by accessible technology, whether personally and publicly availed, can add to knowledge acquisition and skills enhancement by individuals [32]. So, m-learning in the

classroom improves participation in group work and promotes better learning. In Project K-Nect, as shown in [33], teachers declared the value of cell phones in the midst of instructing a class and statistically, student engagement in school and learning was up by 56%. They conceded that using these devices in the classroom warms up students for the “world of work”, and provides them with extended learning [33].

Mobile devices permeate through most educational scenarios and there is a myriad of ways mobile devices come in handy in teaching and learning [34]. This can be through idealizing their own knowledge and collaboratively sharing it through the use of interactive games and contests instated on mobile, the possibilities of incorporating m-learning with e-learning in coming up with suggestions, quizzing and classroom voting. Mobile devices come in handy in improving both individual and collaborative learning in laboratories and conclusively complement formal learning and teaching [34]. In the research done by [14], it concludes that the utilization figures for mobile technologies are comparatively higher than for other technologies such as computers and many learners find these devices fun and easy to use although there is only a limited understanding of what makes cell phones so engaging. According to [35], m-learning is so engrossing because of control and ownership of the mobile gadgets, the fun of using them, quick information sharing and exchange, applicability across different contexts. It is pointed out by [14] that in a conventional classroom setting where instructors are with students, the role of personal motives is at play when connecting with technologies and in some scenarios, an inspiring instructor can motivate students into learning with mobile technologies. A supportive environment for the instructors promotes for better teaching and learning since institutions need government support through initiatives and policies towards that effect.

It is explained by [36] that a close-to-perfect device that reflects what both students and tutors needs in augmenting a mobile device that can provide clear technology support. These features are the physical and virtual resources that are ideally but not quite available. So [36] went on to give a recommended requirements list for the physical and virtual resources on a mobile device that both teachers and students could settle for as thus;

- Full time Internet Connection
- Connection by Bluetooth to other devices
- Full keyboard for writing and answering assignments
- Long Life Battery
- Adequate Memory
- Point to point Communication (GPRS)
- Adobe Reader for documents
- Use of Microsoft Office
- Readable phone screen
- Portable device
- Multimedia Support
- Connectivity to WI-FI

These are ideal features that would detail the physical and virtual resources necessary for learning with cell phones and according to [36], they would best be evaluated on the basis of

ease of use for the student, informative, technically feasible and cost friendly. Amidst the gadget needs and wants, the heart of it all lies within the learning experience being made better with technology.

#### 5. TEL and Its Correlated Benefits

In regard to higher education the issue of enhanced learning is significantly growing into interest for many researchers as well as professionals and it is hence forth technically termed TEL. The aspect of learning is conventionally defined as the process of acquiring competence and understanding [37]. With the above definition, [37] went on to explain that learning results in a new ability to do something, and/or an understanding of something that was previously not understood. In learning, we obtain competence which is described in terms of possessing specific skills as well as understanding which is described in terms of possessing specific knowledge [37]. Technology is quite commonly understood a hardware and software. The use of technology in any event is taken as an action towards quality (may also be seen as value-addition), efficiency and effectiveness. TEL is basically encompasses technology enabled devices in learning. In an e-learning strategy by [8] TEL is defined as improving learning as well as teaching with the application of technological innervations in the process of learning. To expound on this definition, [8] identifies three categories of resulting possible benefits that TEL provides, and these included; *Efficiency* to mean existing learning processes need be conducted in a less costly, timely and scalable approach, *Enhancement* to mean refining the current processes and activities for improved outcomes and *Transformation* to mean drastic and positive adjustments in the prevailing processes as well as developing novel processes. We further found that TEL intervention conception is depicted in two broad goals as [37] reflects below: (1) generally adjusting the institutional teaching approaches; and (2) adjusting the way that lecturers teach and how the students learn.

There three ways technology-enhanced courses can benefit learners. These are explained by [38] as follows;

**Personalization**-accommodate the unique needs of individual learners. All learning environments may not perfectly suite differences amongst learners such as the demographics and lifestyle, a variation in skills set and experiences, plus the specific learner preferences. Perhaps the multiplicity factors for personalization is challenging to tackle in a normal classroom, the online platform avails itself with specific approach to tasks due to the exceptional advancements in interactive. A case in point by [38] shows that podcasts present a good forum for aural learners, whereas mind-mapping innervations enable visual learners to record and perhaps monitor the thoughts or ideas available. Therefore, e-learners are adequately equipped to be able to trace existing knowledge and the non-existent aspects for learning.

**Interactivity**-this presents a shift to active learning which involves exploring a multiplicity of technologies that can be applied to the learners' daily life. These adequately connect

and enable collaborated learning environments comprising of people in a given setting. Experts argue that connection and collaboration amongst groups of learners enables sustainable learning [38]. Leveraging interactive technologies commonly used in people's lives creates virtual collaboration and communities that lessen the effort needed to assimilate pertinent knowledge and strengthen the attainable skills for subsequent careers.

**Engagement**—appropriate technology enabled learning offers extraordinary opportunities to learners in real-time under known conditions. An example by [38] presents a scenario with multiple learner models and videogames engaging learners in problem solving undertakings and learning exercises intended to develop the skills needed to succeed in the different fields. Applied to military preparation and disaster preparedness training in public health, these scenarios eliminate the negative occurrences associated with reality.

### III. METHODOLOGY

The study population comprised continuing students of two universities in Kampala district in Uganda. Kampala was the most appropriate choice because it contains the largest number of universities and has got better Internet connection, better power supply and better mobile device penetration. Makerere University Business School and Kampala International University were chosen because they are in Kampala, which is a convenient location and the learners in these universities have been found to be technologically literate.

TABLE I  
POPULATION DISTRIBUTION BY NATIONAL COUNCIL FOR HIGHER EDUCATION

Institution Name	No. of Students
Makerere University Business School	10731
Kampala International University	13938

Using the correct number of subjects optimizes the probability that a study yields interpretable results and minimizes research waste. The sample size was guided by time available, the financial resources and the necessary degree of precision and confidence. In principle, a simple table by [39] was used to derive the study sample. At a precision level of 0.05 and confidence of 95%, the sample size per university is shown in the table below.

TABLE II  
SAMPLE DISTRIBUTION ACROSS UNIVERSITIES

Institution Name	Population	Sample size
Makerere Uni. Business School	10731	370
Kampala International University	13938	370
<b>Total sample size</b>		<b>740</b>

The primary sampling units were the universities and the secondary sampling units were the students in classrooms. Purposive sampling was used in identifying the respondents who gave appropriate answers relevant to the study. Being a survey, data was collected using a questionnaire. These were self-administered questionnaire because the researchers were

quite in touch with these learners. A total of 518 usable responses were obtained. A review of literary works in previous studies was also done.

### IV. DISCUSSION OF FINDINGS

The respondents were all undergraduate students, where 51% were on Bachelor of Law, 35% were on Bachelor of Office and Information Management, and 14% were on Bachelor of Leisure and Hospitality Management. While 43% were male and 57% were female. The learners enrolled on the above courses were studying more theoretical course units and less practical course units. The learners were asked to indicate activities that have taken place in their regular classroom environment before assessing the possibility of enhancing such activities with technology. The following responses were obtained.

The surveyed learners were asked to indicate the devices they use to enhance learning and achieve intend learning outcomes. The following responses were obtained;

TABLE III  
BENEFITS OF TEL BY LEARNERS IN A DEVELOPING COUNTRY

Mobile Devices Used for Learning	Yes (%)	No (%)	Comment
Smartphone	90.9	9.1	Most Used Device
Laptop	27	73	Moderately used
Tablet Computer	8.1	91.9	Used by very few
Personal Digital/Data Assistant	0	100	None has a PDA

As we had previously anticipated, due to widespread mobile penetration, it was found that most of the learners are in possession of a smartphone. It is therefore the most common device used to enhance their learning process and outcome. Other students indicate that they also have laptops, but very few use tablet computers e.g. iPads, Tabs, etc. to support learning. The reasons behind the choice of device was not investigated in this study. One student has a personal digital/data assistant that they use for enhanced learning. Internet access on these devices is mainly through the purchase of data from Internet service providers to whom the students are connected. There is generally limited/weak access to WI-FI across learning environments or no access at all.

Learners indicated that the most common activities are listening to lectures and gaining skills and knowledge (all agreed). Other common activities were class assignments, continuous assessment tests and group discussions. Learners further indicated that it is quite unusual for them to record lectures for later use, participate in multiple choice quizzes that require immediate answers, watch videos with learning content or illustrations, and listen to lecture broadcasts over the radio.

Learners were introduced to the idea of TEL specifically starting with the available technologies such as mobile phone and laptops, and the current e-learning and mobile learning platforms that are available in their institutions. The table below provides the responses on the perceived benefits of TEL and a discussion follows thereafter.

We found that 81.8% respondents concurred that

smartphones in the classroom can be used by learners to exchange information. Furthermore, learners gain better access to tutors in search of learning materials. This transforms the relation between learners and tutors and also among learners themselves. Learners can request tutors for topics that are not well understood and these can be answered by the tutor in class or make them part of group activities. Tutors can send classroom assignments to their students which the latter retrieve and attempt in class within their groups. Smartphones were originally made for easier, portable and movable communication. In a classroom setting; they can support communication and class coordination among learners and tutors.

phones during class time can enable learners' to access classroom assignments, access learning content and the ability to retrieve uploaded lecture podcasts. Smartphones in the classroom can be used by students to access learning content via an interconnected wireless network or the Bluetooth technology already available on most of these gadgets. Learners can ably access and retrieve class content or interesting papers that add to their knowledge. Students can also use non-contact class hours to retrieve class notes and then use 'normal' class time to study, discuss, have in-class collaborations and do in-class assignments. Learners can record lectures or download podcasts of old and current lectures and can receive assignments sent by the tutor.

TABLE IV  
COMMON ACTIVATES PERFORMED BY LEARNERS IN A CLASSROOM

Common Activities in the Classroom	Yes (%)	No (%)	Mean	Interpretation
Accomplishing individual classroom assignments	81.8	18.2	1.18	Most agree
Accomplishing group assignments	54.5	45.5	1.45	Most agree
Communication between students and lecturer	100	0	1.00	All agree
Participating in group/classroom discussions	90.9	9.1	1.09	Most agree
Undertaking continuous assessment tests	81.8	18.2	1.18	Most agree
Reporting on learning activities	81.8	18.2	1.18	Most agree
Accessing of learning content	81.8	18.2	1.18	Most agree
Participating in question and answer session	100	0	1.00	All agree
Making classroom presentations	81.8	18.2	1.18	Most agree
Recording a lecture and later transmitting it to my fellow students via Bluetooth	18.2	81.8	1.82	Most disagree
Accomplishing multiple choice quizzes with immediate feedback	36.4	63.6	1.64	Most disagree
Listening to straight lectures	81.8	18.2	1.18	Most agree
Listening to lectures broadcast on radio	0	100	2.00	All disagree
Watching videos that relate to the topic being learnt	45.5	54.5	1.55	Most disagree
Reviewing learning materials at my own pace.	90.9	9.1	1.09	Most agree
Learning skills and knowledge	100	0	1.00	All agree

TABLE V  
PERCEIVED BENEFITS OF TEL BY LEARNERS IN A DEVELOPING COUNTRY

Perceived Benefit of TEL by the learners	Yes (%)	No (%)	Mean	Interpretation
Accomplishing classroom assignments	81.8	18.2	1.18	Most agree
Accessing classroom assignments	90.9	9.1	1.09	Most agree
Accomplishing take home course works	81.8	18.2	1.18	Most agree
Communication between students and lecturer	100	0	1.00	All agree
Coordinating classroom activities	90.9	9.1	1.09	Most agree
Participating in group/classroom discussions	81.8	18.2	1.18	Most agree
Undertaking continuous assessment tests	45.5	54.5	1.55	Most disagree
Reporting on my progress	81.8	18.2	1.18	Most agree
Accessing of learning content	100	0	1.00	All agree
Participating in question and answer session	54.5	45.5	1.45	Most agree
Making engaging classroom presentations	27.3	72.7	1.73	Most disagree
Recording a lecture and later transmitting it to my fellow students via Bluetooth	81.8	18.2	1.18	Most agree
Accomplishing group assignments	90.9	9.1	1.09	Most agree
Accomplishing multiple choice quizzes with immediate feedback	72.7	27.3	1.27	Most agree
Listening to straight lectures	45.5	54.5	1.55	Most disagree
Listening to lectures broadcast on the radio	54.5	45.5	1.45	Most agree
Watching videos that relate to the topic being learnt	90.9	9.1	1.09	Most agree
Reviewing learning materials at my own pace.	100	0	1.00	All agree
Learning skills and knowledge	100	0	1.00	All agree

Improved group work and collaboration can be advanced through the use of smartphones in the classroom. On this, it was found that this interactivity is promoted through using mainly smartphones to carry out classroom discussion, for communication and co-ordination and group work. A smartphone may be able to help students read more about topics they would normally find cumbersome to research. It also transmutes conduct, as it increases the learner's confidence due to the fact that they can study in their time, and also work together with tutors and exchange ideas on a large scale. Group work and class discussions can be improved through the use of Internet enabled smartphones. This is because the use of the Internet can provide well researched information that can improve the discussion output of the learners. Learners are able to collaborate and exchange information, so that they ably transform what they have been taught and what they have learnt into knowledge. Perceived Access to learning content is critical in the enhancement of classroom learning in any context. The usage of mobile

The constructs that have been discussed above are derived from respondents as benefits that emanate from using an m-learning to enhance classroom learning. However, aside from the study results, the review of literature also highlights the provisions that need to be in place for a conventional classroom to smoothly integrate m-learning so as to enhance classroom learning, and these are; training learners and tutors on mobile technology [15], [40], developing a shared web space, strategizing with institutional guidelines [41], motivate learners [15] and institutional support [41], [15], [12].

#### V. PERCEIVED BENEFITS OF TEL – THREE BAND PERSPECTIVE

The classroom describes the environment in which the

smartphone is being employed. Using the smartphone in today's classroom would stimulate interactive and autonomous learning co-currently. The findings of this research have shown that mobile phones are usable in the classroom. It is the instrument that is utilized, while WI-FI is the technological platform that allows access to the Internet. M-learning in the classroom can allow better interactivity, smoother learning and access to information like never before. It allows students to access and read content at a personal and comfortable pace. Quick access to illustrations and publications can greatly improve students' ability to grasp concepts that lecturers usually labor to explain. The findings exposition of the study indicates that the integration of smartphones formally into conventional classrooms is inevitable because they avail a lot of pros that not only learners, but also lecturers benefit from in a number of ways. Enhanced learning through mobile devices like a smartphone is perceived to i) improve group work and collaboration, ii) exchange and communication, and iii) access to learning content.

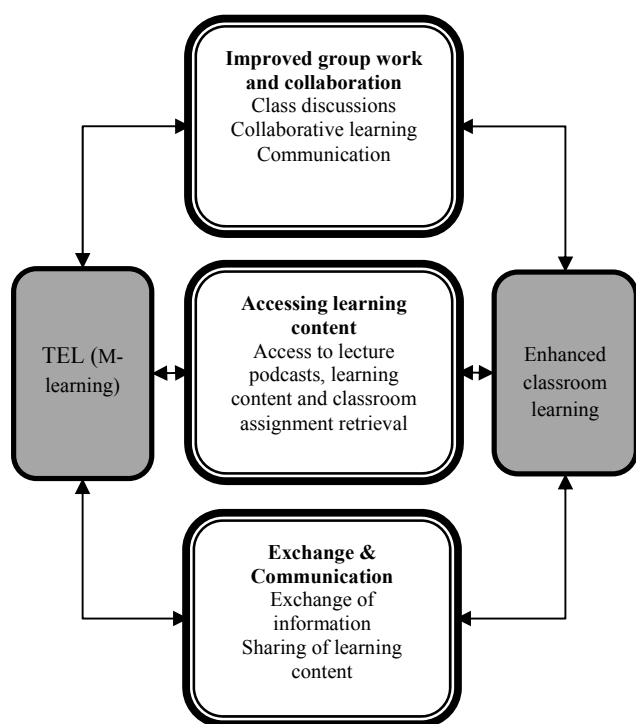


Fig. 1 Perceived Benefits of TEL from a Learner's Perspective

## VI. CONCLUSION

The derived benefits were studied in relation to enhanced classroom learning. Smart phones are perceived as core devices in this environment and are believed to be useful inside the classroom to both tutors and learners. WI-FI infrastructure to support m-learning in the classroom is required as a foundation set-up. The challenges anticipated about the issue of using smartphones in a classroom are ideally controllable and may not warrant relinquishing the potential benefits. More studies to establish challenges that

may be experienced for individual courses and how they may inhibit the intended outcome may be conducted. Pedagogy issues in TEL should also be investigated to establish limiting factors. Visual and hearing impairments among learners in TEL environments in emerging economies may also be investigated.

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