
# Enhancing learner-centred practices among technical education students through the use of mobile devices as learning tools in Malawi

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**Definitions of key terms/concepts**

**Mobile device:** any device that allows mobile teaching and learning such as a smartphone, tablet and laptop

**Interdependent learning:** a learner's ability to learn on their own through exploration, discovery, research, testing hypotheses, validation and collaboration

**Double and triple-loop learning:** a learner's ability to analyse what has been learnt and the learning process itself as well as to develop innovative and effective approaches of dealing with complex issues

**Heutagogy:** a learner-centred approach in which learners 'learn how to learn' by defining their own learning paths and identifying appropriate learning styles

**Heutagogical use:** a learner's ability to use their mobile devices for practices related to interdependent learning, double and triple-loop learning and participation in communities of practice

**Learner:** a student in a pre-school institution, primary school or secondary school

**Mediated learning experience:** an experience which occurs when learners are guided to 'learn how to learn' by someone who is more knowledgeable

**Participation in communities of practice:** active involvement in an academic grouping concerning individuals who have a shared domain of interests

## 1. Background

In Malawi, secondary education is provided through conventional secondary schools, private secondary schools and community day secondary schools (CDSSs). The best students in the Primary School Leaving Certificate Examinations (PSLCE) get selected to conventional secondary schools, while the rest are enrolled either in private secondary schools or in CDSSs. Most of the conventional schools are well-financed and have adequate teaching staff. Some of the private secondary schools are expensive elite schools, but most are much less expensive schools which target children from low-income households. CDSSs are second-tier secondary schools established at the community level, to increase and widen access to education. These schools operate in the afternoon and use the existing infrastructure of primary schools. Furthermore, CDSSs are financially

constrained and are chronically short of teachers. Beytekin and Chipala (2015) revealed that about 60% of the teachers from the CDSSs in their study were under-qualified, against only 10% in conventional secondary schools (see also Chakwera & Saiti, 2005). The minimum qualification for secondary school teachers is a Diploma in Education. While unqualified teachers possess a diploma or degree in a field other than education, under-qualified teachers do not have a diploma at all. Unqualified teachers are required to undergo professional teacher training to attain a University Certificate of Education (UCE).

According to the Malawi Education Sector Performance Report (MESPR), more than 60% of the teachers in secondary schools are unqualified (Malawi. Ministry of Education Science and Technology [MoEST], 2015). The government of Malawi hires under-qualified and unqualified teachers to fill acute staffing gaps at the secondary school level (Malawi. MoEST, 2015). Secondary school student-teachers are recruited either among fresh secondary school graduates or through upgrading schemes which target practicing, unqualified or under-qualified teachers who want to advance their qualifications.

Technical education is affected by two main sets of challenges facing all levels of education in Malawi: underfunding and outdated teaching approaches. The overall national budget allocation for teacher education is mostly insufficient (Nkhokwe et al., 2017). The pupil-teacher ratio (PTR) at the secondary school level, which was 41:1 in 2015, is higher than the MoEST target of 20:1 (Index Mundi, 2017, sourced from the United Nations Educational, Scientific, and Cultural Organization [UNESCO] Institute for Statistics). The MoEST, through the National Education Sector Plan (NESP) for the 2008 – 2017 period, acknowledges that limited funding leads to inefficiencies that affect the quality of teacher education (MoEST, 2008). A poor learning environment in colleges impacts negatively on the preparation of teachers and demotivates potential student-teachers to enrol (see also Msiska, Chimpololo, Liwambano, Maere, Mbendera, Phiri, Salagi, & Yambeni, 2013). Mobile devices have proven quite useful in enabling students to access additional learning resources at their own convenience, to complement what they learn in class in other countries such as South Africa (Thinyane, 2010) and Tanzania (Mtega, Bernard, Msungu, & Sanare, 2012). There is a great opportunity for students in

developing countries to use low-cost technologies like mobile phones to enhance their teaching and learning processes, in the face of adverse conditions in colleges.

There is currently a divide between policy and practice on learner-centred education in Malawi. Whilst government policies and donor-funded programmes direct educational institutions to use learner-centred approaches, the education system is characterised by teacher-centred approaches (Chilemba & Bruce, 2015; Mizrachi, Padilla, & Susuwele-Banda, 2010). Although the teacher training curricula promote the application of learner-centred approaches, Mizrachi et al. (2010) observe that the reality in training institutions is different as lecturers tend to use teacher-centred approaches. They further note that most students lack the ability to transfer skills from college to the workplace after their graduation. Students may be negatively influenced by the teacher-centred approaches in the training colleges, as well as by the limited use of ICTs and other resources. Learner-centred approaches are desirable in education because they promote learner independence, increase motivation and enhance learners' control of the learning process (Blaschke, 2012). In developing countries, there is a further need for novel approaches, which could not only help to increase learner-centeredness, but also empower trainee-teachers to manage their learning processes effectively and efficiently.

Heutagogy is a learner-centred approach in which learners 'learn how to learn' by defining their own learning paths and identifying appropriate learning styles (Hase, 2009). The approach helps to increase self-efficacy, enables learners to manage their own learning, as well as reflect upon what is learned and how it is learned (Booth, Blaschke, & Hase, 2016). The concept of heutagogy is rather new in Africa, let alone Malawi. Anderson (2010) views heutagogy as a 'net-centric approach' that takes advantage of the key affordances of the internet and serves as a framework for digital age teaching and learning (see also Wheeler, 2011). Mobile devices provide an opportunity for the students to operate independently, as they would be able to access online teaching and learning resources at their convenience. The use of mobile devices could also help to enhance teaching and learning processes among technical education students in the face of acute teacher shortage. In this study, the students used their existing mobile devices.

## 2. Research objectives and questions

The aim of this research was to examine the adoption of learner-centred practices through the use of mobile devices among technical education students at MUBAS and LTC. To achieve this aim, the study will attempt to address the following research questions:

1. To what extent are mobile devices accessed and used as tools for learning among technical education students at MUBAS and LTC?
2. What learner-centred practices (if any) associated with the use of mobile devices are emerging at the college?
3. To what extent does the use of mobile devices influence learner-centred practices among technical education students?
4. What perceived barriers affect the use of mobile devices for teaching and learning among the technical education students?

## 3. Intended outcomes

The present study contributes to the growing body of literature on the use of mobile devices for academic purposes in developing countries. Existing literature suggests that most studies conducted on the use of mobile devices in Southern Africa and Asia did not focus on teacher training, but rather their general use in education (Carrier, Finholt-Daniel, & Sales, 2012; Mtega et al., 2012; Thinyane, 2010), as well as the related experiences and challenges (Msiska et al., 2013; Perkins, Gwayi, Zozie, & Lockee, 2005).

The study offers knowledge on novel approaches to the use of ICTs in education through heutagogical learning, a new field that has only emerged during the past two decades (Blaschke, 2012). Most of the available literature on heutagogy concerns studies that have been conducted in the West and Asia, and their focus was limited to the application of heutagogical principles in fields like vocational education, nursing and engineering (Bhoyrub et al., 2010; Gazi, 2014; Hase, 2011). It is interesting to examine the application of heutagogy in the Malawian context, considering the challenges currently facing the technical education sector as discussed earlier. Furthermore, the use of mobile devices could help to skew teaching and learning practices in these institutions towards learner-centred approaches.

## 4. Methodology

### 4.1 Research design and participants

This study is an action research case study within the interpretive paradigm. The interpretive paradigm is primarily concerned with generating context-based understanding of people's thoughts, beliefs, values and associated social actions. When applied to educational research, the paradigm enables researchers to build rich local understandings of the life-world experiences of teachers and students, and of the cultures of classrooms, schools and the communities they serve (Taylor & Medina, 2013). In the present study, the paradigm has been used to analyse the attitudes and experiences of technical education students concerning the heutagogical use of mobile devices. The study applies the combined-methods approach with a bias towards the qualitative methods.

This study involved103 technical education students at MUBAS and 35 students at LTC. Initially, the research planned to include lecturers at both institutions but unavailability affected their implementation.

### 4.2 Data collection

The study will comprise two main phases: situational analysis and usage examination. In addition, the data collection exercise included a questionnaire survey and semi-structured interviews.

The questionnaire survey will take place during the situational analysis. Purposive sampling was used to recruit the participants to ensure that students with at least one device were selected (this helped to ensure that the data is rich enough to allow comparison of usage across different devices) as participants. The usage examination phase concerned a deep analysis of the issues through semi-structured interviews. The survey involved a questionnaire comprising two sections: the first section collected demographic information pertaining to the type or field of study, year of study, gender,

age, teaching experience and place of work and the second one obtained information regarding the main research questions.

### 4.3 Data analysis procedures

Data analysis was an on-going process in this study. The first phase begun right in the field during the data collection exercise where emerging themes were noted and preliminary data categorization done. Data was entered in an Excel spreadsheet for proper data management. The second phase focused on analysis of the data based on the heutagogical principles and UTAUT. The analyses enabled us to determine the extent to be mobile devices used for academic purposes among the students and any learner-centred practices associated with the use of mobile devices that are emerging at the two institutions. The analyses will further concern examining the extent to which the use of mobile devices influence learner-centred practices among the students and how it affects the students' intention to use mobile devices in their teaching and learning.

The analyses also helped to determine the perceived barriers that affect the use of mobile devices for teaching and learning.

### 4.4 Ethical Clearance

Our university has a Research Ethics Committee which vets research studies for ethical clearance. The procedures require that all research studies should be submitted to the Committee for approval for commencement of field work, and this study followed the same. The Committee then reviews the proposal and checks whether appropriate ethical procedures have been outlined to ensure that there is no infringement on other people's rights, consent is sought from participants to take part in the study, and guidelines on audio or visual recordings are followed, among other things.

All the data collected in this study was treated anonymously and no names of the participants have been mentioned anywhere in the research report. Additionally, all the data collected on mobile devices has been utilised with utmost confidentiality and no identity of the participants has been revealed.

## 5. Results and discussion

The research indicates that 100% of the students at MUBAS (all 103 students) and 97% at LTC (34 out of 35) smartphone. The statistics suggest that smartphone ownership at the two institutions is almost ubiquitous. In addition, about 37% of the students at MUBAS (37 out of 103) and 34% at LTC (12 out 35) had laptops. There is a low access to laptops at both institutions with less than half of the students owning such devices. Table 1 shows the trend of access to mobile devices among technical education students at the two institutions.

**Table 1: Access to mobile devices**

| | **MUBAS (103 TUDENTS)** | | **LTC (35 TUDENTS)** | |
|---|---|---|---|---|
| **DEVICE TYPE** | **FREQUENCY** | **PERCENTAGE (%)** | **FREQUENCY** | **PERCENTAGE (%)** |
| Basic Mobile Phone | 0 | 0 | 0 | 0 |
| Smart Phone | 103 | 100 | 34 | 97 |
| Tablet | 0 | 0 | 0 | 0 |
| Laptop | 37 | 37 | 12 | 34 |
| Others | 0 | 0 | 1 | 3 |

Whilst the majority of students at both institutions have a smartphone, none has a basic phone. The results suggest that the students strive to obtain smartphones as they have advanced features ideal for tertiary education such as the internet, search engines, big data storage room, and high operation speed. The table shows that tablet ownership is almost non-existent. No student has access to a tablet at both institutions.

### 5.2 Usage of mobile applications

With regards to mobile application usage, all the students at MUBAS (100%) stated that they tend to utilise the internet for learning purposes while 97% of the students at LTC (34 out of 35) indicated the same. WhatsApp seems to be a popular mobile application at both institutions with 100% of the students at MUBAS and 94% at LTC indicating that they use the mobile application in their studies. For Facebook, all the students at MUBAS (100%) and 83% at LTC use the mobile application in their education activities. There is also a high usage of TikTok among the participants. About 75% of the students at MUBAS (77 out of 103) and 63% at LTC (22 out of 35) utilize the mobile application for academic purposes.

**Table 2: Usage of mobile applications**

| | **MUBAS (103 TUDENTS)** | | **LTC (35 TUDENTS)** | |
|---|---|---|---|---|
| **APP TYPE** | **FREQUENCY** | **PERCENTATE (%)** | **FREQUENCY** | **PERCENTATE (%)** |
| Internet | 103 | 100 | 34 | 97 |
| WhatsApp | 103 | 100 | 33 | 94 |
| Facebook | 103 | 100 | 29 | 83 |
| X (Twitter) | 29 | 28 | 10 | 29 |
| Tiktok | 77 | 75 | 22 | 63 |
| Others | 1 | 0.9 | 2 | 6 |

The use of X is quite low at both institutions, with MUBAS registering 28% and LTC 29% respectively. However, there is a low usage of other mobile applications such as Instagram and LinkedIn at both institutions. Generally, the statistics suggest a high usage of mobile applications at MUBAS compared to LTC.

### 5.3 Extent of mobile device usage

Generally, there is a high usage of mobile devices for education purposes. About 77% of the students at MUBAS and 94% at LTC respectively use their devices for learning.

However, 23% of the students at MUBAS utilise their devices more than once a week while 9% do so at LTC. Although there are slight differences, academic usage of mobile devices tends to be high among students at the two institutions.

**Table 3: Extent of mobile device usage**

| | **MUBAS (103 TUDENTS)** | | **LTC (35 TUDENTS)** | |
|---|---|---|---|---|
| | **FREQUENCY** | **PERCENTAGE (%)** | **FREQUENCY** | **PERCENTAGE (%)** |
| **Daily** | 79 | 77 | 33 | 94 |
| **Once a Week** | 0 | 0 | 0 | 0 |
| **More than once a week** | 24 | 23 | 2 | 9 |
| **Once a month** | 0 | 0 | 0 | 0 |
| **None at all** | 0 | 0 | 0 | 0 |

The results further show that the students at both institutions use their mobile devices at least once every week in their studies. The trend demonstrates that mobile devices have been heavily adopted and leveraged for academic purposes by students.

### 5.4 Effectiveness of mobile devices for teaching and learning

About 48% of the students at MUBAS and 51% at LTC (18 out 35) regard the use of mobile devices for teaching and learning as very effective. On the other hand, 28% of the participants at MUBAS and 29% at LTC (10 out 35) perceive the use of mobile devices as slightly effective. Additionally, about 21% of the students at MUBAS and 17% at LTC (6 out 35) regard the use of mobile devices as not effective at all.

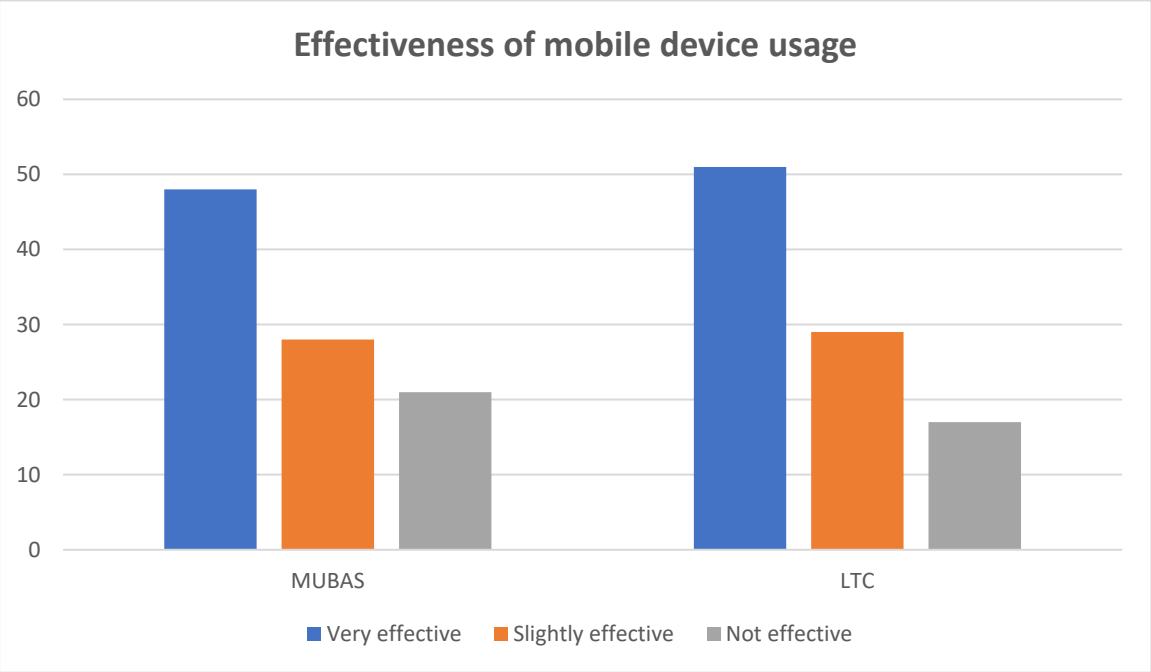


**Figure 1: Indicating the effectiveness of mobile devices for academic purposes**

Therefore, the results indicate that using mobile devices in teaching and learning is effective to a certain extent, as a large percentage of the respondents demonstrated a strong positive perception of the effectiveness of such devices.

Students evaluated the effectiveness of various communication methods (WhatsApp, email, physical meetings, SMS, phone calls, etc.) with a range of perspectives, often highlighting a trade-off between convenience and accessibility. Several students found methods like WhatsApp to be "very effective" and "active," appreciating their ease of use and efficiency. The cost-effectiveness and convenience compared to physical meetings were also noted as significant advantages. However, a recurring theme of ineffectiveness revolves around the cost of internet data ("bundles") and poor internet connectivity, which hinder participation and access to information for some students.

Financial barrier to owning necessary devices was also mentioned as a factor limiting the effectiveness of digital methods for certain individuals. While some acknowledged the usefulness of each method in facilitating communication, learning, and teaching, the reliance on internet access and the associated costs appear to be significant drawbacks

for a subset of the student population, making the effectiveness of these methods somewhat dependent on individual circumstances and resources.

### 5.5 Challenges impeding mobile device usage

Several challenges were highlighted by students regarding maintaining contact and academic engagement with lecturers or tutors during internships, practical attachments, or holidays. Poor network connectivity and slow internet speeds were frequently cited as significant obstacles. The high cost and lack of availability of data bundles also emerged as a major barrier to online communication. Furthermore, the physical distance between students at their attachment locations and the lecturers was noted as a challenge, making it difficult to get timely responses, especially for issues requiring physical meetings. Students also mentioned the issue of lecturers being busy or sometimes not answering phone calls, affecting the convenience of communication. Finally, the infrequency of supervisory visits during practicals was raised as a concern, indicating a lack of consistent engagement and guidance during these crucial periods.

### 5.6 Adoption of self-learning activities

#### 5.6.1 Participation in education forums

This research suggests that few students continue doing their academic activities outside the school campus. Such environments include their workplace, home or hostel. About 15% of the students at MUBAS and 18% at LTC stated that they continue to perform their academic activities outside the school campus.

In terms of participation in online communities of learning, all the students at MUBAS (100%) and 73% at LTC indicated that they are members of such forums. In these forums, the students discuss and share knowledge and experiences concerning educational matters with other people. The statistics suggests that students at MUBAS have widely embraced online academic forums and utilised information and knowledge sharing with lecturers, tutors, and other students.

In addition, all the students at MUBAS (100%) and 87% at LTC have membership in various social media forums such as WhatsApp, Facebook, X, and Instagram. The students referenced WhatsApp forums the most, acknowledging its role in facilitating activities such as sharing notes, making announcements, submitting assignments and facilitating communication with lecturers. Additionally, Facebook forums, particularly the MUBAS Student Union (MSU), were noted as a means for sharing information and informal interactions. Google Classroom and Google Meet also received wide mentions from students, as lecturers use these platforms to share learning materials and schedules and conduct online lessons. Furthermore, students pointed out WhatsApp forums specific to their academic disciplines and courses, including MUB TED (Science), MSE3 Calculus, Society of Education and Media Studies (SECOM), and Multivariate Calculus.

**5.6.2 Nature of academic activities in education forums**

According to the students, these platforms were instrumental in sharing academic study materials, asking lecturers or tutors questions, conducting online discussions, submission of assignments and communicating essential details such as class postponement and make-up lesson times. Additionally, students also reported membership in forums beyond their university such as TEVET groups. Overall, they indicated that teaching and learning is largely facilitated by the digital connections students maintain with their lecturers, tutors, and fellow students through various online forums. This highlights how these platforms are highly embraced and leveraged in the educational process.

The students were also asked to explain issues or activities discussed on the forums. The majority of students indicated that the forums were mainly utilized to share notes, tutorials, and academic documents. Additionally, students use such forums for collaborative learning, for example, discussing challenging concepts, solving mathematical problems, and asking lecturers or tutors academic questions. Furthermore, the students noted that such forums were instrumental for communicating class periods, postponing classes, and sharing exam schedules.

Apart from direct academic interactions, students indicated other forums utilized for other purposes such as sharing advertisements and addressing issues of student security.

However, a different perspective was raised by one who believed that these forums are rarely used for academic purposes, instead, students usually use them to share jokes and other information irrelevant to academics. This perspective helped expose the potential for such forums to deviate from the initial academic purposes they were created for. Despite this, the overall the results indicate that these forums are mainly used for information sharing, collaborative learning, and asking questions.

### 5.6.3 Extent of support from knowledgeable others

With respect to guidance on solving educational problems, about 92% of those participating in forums at MUBAS and 68% at LTC indicated that they get valuable assistance on academic issues from more knowledgeable members in the forums. A majority of students further elaborated that they receive help not only from peers who are more knowledgeable but also the lecturers and tutors. Examples provided include students helping each other understand difficult concepts, experienced members guiding other members of the forums, and problem-solving through collaborative learning.

The MUBAS Student Union (MSU) Facebook page is also mentioned as a source of guidance. Several students confidently explained that those with a better understanding assist others when questions arise, which facilitates collaborative learning in the process. The trend suggests that these online forums serve as valuable resources for receiving guidance and support in overcoming educational challenges from fellow members. Students explained that sometimes even the lecturers and tutors share helpful materials. This demonstrates the role that such digital forums play in facilitating the teaching and learning process.

## 5.7 Adoption of simulation software

When students were asked if they use simulation software in science and technical courses, the responses demonstrated a mixed trend in terms of adoption of such software. Several students indicated "No," which implied that they had never used such software before. However, a number of students indicated that they had used various software tools. Statistical software packages like SPSS and STATA were frequently mentioned,

suggesting their use in analyzing data related to science and technical fields even though they cannot be traditionally classified as simulation software.

In the context of drawing and design, AutoCAD was identified. Programming students mentioned using C++ and its output console as a form of resembling real program behavior and JAVA for software development. Interestingly, some students listed general-purpose tools like MATLAB, Symbolab, and Latex, and even web browsers like Chrome and search engines like Google as resources they utilize, possibly for accessing information or performing calculations rather than running dedicated simulations. Tools like graphing calculators and Math Papa were also mentioned, indicating the use of software for mathematical problem-solving.

One student mentioned relating concepts to "real-life situations" as their method, which is not software but an approach to understanding. The diversity of tools mentioned suggests that while dedicated simulation software might not be universally adopted, students are leveraging a range of digital resources to support their learning in science and technical disciplines, encompassing statistical analysis, design, programming environments, and general information access.

When students were asked how lecturers cope when faced with a lack of necessary equipment and tools for certain science and technical topics, they indicated that lecturers and tutors employ a range of alternative strategies to facilitate student understanding. A common approach mentioned involves leveraging readily available visual aids, such as printed pictures and videos sourced from the internet or platforms like YouTube. These visual resources help to illustrate concepts and demonstrate processes that would typically be experienced through hands-on experimentation.

Oral descriptions are also a key pedagogical tool, with instructors relying on detailed explanations to convey the functionality and application of missing equipment. Furthermore, some lecturers utilize technology like laptops and projectors to present information and videos to the entire class, ensuring a shared learning experience. Access to the internet is also facilitated, encouraging students to conduct their own research and explore relevant materials online. In some instances, instructors adapt their teaching by

using locally available resources as substitutes or analogies to explain complex principles. These varied methods demonstrate a resourceful approach to overcoming limitations in physical resources, prioritizing visual learning and theoretical understanding through accessible alternatives.

### 5.8 Pedagogical orientation

Students' evaluations of their lecturers' teaching methods present a range of perspectives, with a significant number expressing positive views. Terms like "effective," "very effective," "good," "quite good," and "satisfying" appear frequently, indicating that many students find the methods employed to be helpful in their understanding. Some students specifically highlight the resourcefulness and connections of certain lecturers, as well as methods that are learner-centered and promote students' own contribution.

The use of visual aids like printed materials and videos is appreciated for providing a clearer picture of real-world equipment and facilitating understanding. However, not all feedback is positive. Some students feel the methods are "not enough" or only "slightly effective." One student points out a potential bias, suggesting that methods might be simple for the lecturer but not universally effective for all students. Another student expressed concern about the limitations of improvisation when there is a total lack of materials. There is also a specific critique regarding the use of PowerPoint for teaching mathematics, deeming it ineffective. Overall, while a majority of students seem to appreciate the teaching methods, there are also notable concerns about their sufficiency, effectiveness for all learners, and appropriateness for certain subjects.

## 6. Conclusion

While access to mobile devices is almost ubiquitous at both MUBAS and LTC, smartphones are the most preferred device by students seconded by laptops. Smartphones lure the students because of their advanced features such as the internet, search engines, big data storage room, and high operation speed which facilitate effective learning. Although usage of mobile devices for learning purposes is high at both institutions, students at MUBAS tend to use their devices increasingly than their

counterparts at LTC. To a larger extent, the students perceive mobile device usage to be effective despite some challenges related to the high cost of internet data and poor internet connectivity which hamper access and participation to mobile learning. The students further enhance their learning experience by participating in online communities of learning which allow discussions and sharing of knowledge and experiences concerning with other experts in various field. Such fora enable members to help each other in understanding difficult concepts and problem-solving through collaborative learning. Usage of simulation and other technologies also seem widespread at both institutions with cases provided pertaining to the application of softwares such as C++ and its output console simulate real programme behavior, JAVA for software development, and graphing calculators and Math Papa for mathematical problem-solving.