**Chapter 2**

## **2.1 Introduction**

E-learning technology is one of the most effective assets for growing knowledge, skills and development in any institution of learning. The e-learning technologies are driven by the use of Information and Communication Technology (ICT). ICT refers to the totality of methods and tools that are used in gathering, storing, processing and communicating information (Olutola & Olatoye 2015).

Mobile based interface

A mobile user interface is the graphical and usually touch-sensitive display on a mobile device, such as a [smartphone](https://searchmobilecomputing.techtarget.com/definition/smartphone) or [tablet](https://searchmobilecomputing.techtarget.com/definition/tablet-PC), that allows the user to interact with the device’s [apps](https://whatis.techtarget.com/definition/mobile-app), features, content and functions.

Mobile user interface ([UI](https://searchwindevelopment.techtarget.com/definition/GUI)) design requirements are significantly different from those for desktop computers. The smaller screen size and [touch screen](https://whatis.techtarget.com/definition/touch-screen) controls create special considerations in UI design to ensure usability, readability and consistency. In a mobile interface, symbols may be used more extensively and controls may be automatically hidden until accessed. The symbols themselves must also be smaller and there is not enough room for text labels on everything, which can cause confusion.

Users have to be able to understand a command [icon](https://whatis.techtarget.com/definition/icon) and its meaning whether through legible text or comprehensible graphical representation. Basic guidelines for mobile interface design are consistent across modern mobile operating systems.

Other types of interface include web based interface. Web based interface is the interaction between a user and software running on a Web server. The user interface is the Web browser and the Web page it downloaded and rendered

## **2.2 Interface design**

User interface (UI) design is the process of making interfaces in software or computerized devices with a focus on looks or style. Designers aim to create designs users will find easy to use and pleasurable. UI design typically refers to graphical user interfaces but also includes others, such as voice-controlled ones.

### **2.2.1 Approaches to Designing Mobile Based Interfaces.**

**Mobile task**

A task can be visualized as a use case scenario based on product operation or application task. Biel et al. (2010) have categorized task as functionality, workflow, interactions, duration, type, complexity and dependency. Task difficulty can be measured in terms of product expectations (Raita and Oulasvirta, 2011).

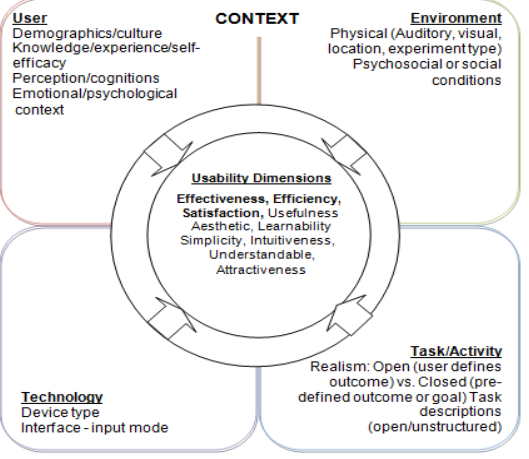
**Mobile technology**

Device profile can be categorized by device characteristics and features, hardware, software and network connectivity (Biel et al., 2010). As this study concerns mobile devices, it covers the characteristics pertaining to mobile technology. Heo et al. (2009) defined mobile devices as portable, self-contained information to the communication system. Three main features of mobility: they use user’s hands, operated without cables, support applications and connected through the Internet (Ali et al., 2012).

**Mobile environment**

The environment can be viewed as geographic location, environmental data such as temperature, noise, social conditions such as a group of users or event that take place. It also covers the stability of connections and the capabilities of device to collaborate with others (Biel et al., 2010).

The figure below shows context



### **2.2.2 Mobile Based Interface for E-learning**

E-learning involves learning through the use of Information and Communication Technology (ICT) infrastructures.

Rosenberg (2001) defines learning as “the process by which people acquire new skills or knowledge for the purpose of enhancing their performance”.

Mobile based interface is a natural extension of E-learning and has the potential to make learning even more widely available and accessible to the smart phone users. It offers open doors for the advancement of cooperation among lecturers and students (Georgieva et al., 2004).

### **2.2.3 Requirement for Designing Mobile Based Interface for eLearning**

**1. Respect the platform**

We documented patterns and components based on native operating systems that we have apps on: iOS and Android. When designing for native platforms, one should consistently refer to the native OS design guidelines first for maximum quality. Keep in mind that native platform guidelines constantly evolve, so it’s always good practice to stay on top of these guidelines and refresh memory and knowledge often.

**2. Focus on the customer benefit**

Always design for the customer benefit first. No use case is the same, and many use cases have exceptions. Do not design something simply because you can reuse a pattern or component for another feature. Design patterns help ground us as a system and unify an experience across an ecosystem of products, but they should by no means be the first or last stop in the design process. Always question yourself: How will this benefit the customer?

**3. Think device first**

Push your thinking beyond “mobile first.” Start thinking about leveraging device capabilities first. The native mobile device has a lot to offer: touch, voice, pressure, location tracking, accelerometer, notifications, etc. You are designing around the device, the platform, the user experience. How can these device features be utilized in our products? How can the mobile device benefit users beyond the screen interface in front of them?

**4. Keep scalability in mind**

Scalability across devices, more specifically between a phone and tablet, is a common challenge among designers. When we think of mobile devices, we know there are tablets, phones, phablets Some of the recurring questions I get asked are: Should there be parity between web and tablet designs? Can we translate the phone patterns to be the same on tablets? How do we design for phablets? To answer these questions, we researched with users, took an in-depth look at device interfaces and screen sizes, and set some standards. While the phone and tablet share many similarities, users use them very differently.

### **2.2.4 Methods for Implementing Mobile Based Interface for eLearning**

[School of Open, Distance and eLearning (SODeL)](http://www.jkuat.ac.ke/schools/SODeL/) has developed an LMS (Learning Management System) based on Moodle. Until now SODeL Mobile application development has never been done, but one of the strategies to increase the use of LMS is by developing a mobile application. At the time of developing the application, the risk of failure also needs to be considered. According to Weinschenk, three of the 12 common causes of failure of software development projects are closely related to the user experience the needs are not well defined; Lack of communication between developers and users; And stakeholder politics. Weinschenk also added that the user experience problem can be overcome with user-centered design, which focusing on gaining a deep understanding of the pre-users throughout design and development life-cycle. Therefore, it is necessary to implement and evaluate the SODeL Mobile design with user-centered design into mobile application.

**2.2.4.1 Based on User-Centered Design**  
User Centered Design (UCD) is a framework of designing and developing products that focus on  
understanding the potential users . This framework also guarantees the product will easy to be used. The International Usability Standard ISO 13407, which is the basis for UCD, stated six things that must be pointed out in UCD. It emphasizes the user involvement in design, development, and evaluation.  
The design prototype of SODeL based on user-centered design was introduced by Ibadurrahman.  
He developed the prototype by improving a previously made prototype which designed based on Moodle Mobile, a mobile app created using HTML 5. By using UCD he constructs the prototype using Material Design principal, which is commonly used on Android devices. Using commonly used design principal will make the user easier learning the application.  
**2.2.4.2 Android Platform-Based Application**  
Platform-based apps are an application that is specifically created and used on a specific platform, for example only on the Android operating system. This type of application is developed using a specific programming language (e.g. Java), but is more dependent on the use of application frameworks, supporting libraries and runtimes in the form of thousands of lines of code typically written in C and C ++. In the Android operating system, applications are usually developed using the Java programming language with the help of application frameworks that provide access to the API framework so that it can be used by core applications

### **2.2.5 Methods for Evaluation**

Saleh et al., (2015) Usability measurement is tedious work, particularly for current smart mobile devices. With an increasing capacity for greater user interactivity through a range of tasks and in a variety of contexts during time, the importance and impact of mobile device context-of-use components is of particular interest to researchers. PACMAD was introduced as comprehensive usability model for mobile applications to evaluate usability based on usability factor; user, context of use, and task. PACMAD model identified the usability attributes without considering related low level metrics which represents each attribute. Thus, there is a need to be extended to include relative low level metrics in addition to usability attributes.

**PACMAD usability model (2013) and Extended PACMAD (2015)**

The study of (Harrison, Flood, & Duce, 2013) introduced a new usability model named PACMAD (People at the Centre of Mobile Application Development) to overcome the limitations that exists in the present usability models used to measure the usability of mobile.

(Ojokoh, 2015) Author argued that mobile devices require specific usability models. They thus developed the PACMAD. The point of their model is expanding existing ease of use models, for example, Nielsen's or the ISO, to the setting of versatile applications. For instance, they contended that, during the application advancement, extra usefulness administrations can be attached to a product application to permit client greater achievement with the application. However, when it comes to mobile devices, this additional functionality increases the software complexity. Thus, the user’s primary goal became difficult to accomplish via the device. The PACMAD model has seven parts. For each, the creators offer definitions, measures, and affiliations. The segment adds up to Effectiveness, Efficiency, fulfillment, learnability, memorability, blunders and psychological burden. The consideration of intellectual burden is considered as PACMAD's ease of use model fundamental commitment for the investigation of ease of use. Like models, PACMAD likewise needs rules and measurements identified with picked measurement and furthermore expect assessment to look at its precision for portable applications. Therefore, fill this hole by stretching out PACMAD to incorporate relative low dimension measurements notwithstanding ease of use traits. This Extended variant contains 21 measurements. GQM (Goal Question Metric) advisers for create ease of use measurements coordinating those measurements yielded from writing. Two assessment instrument undertaking rundown and client fulfillment poll are utilized to gather objective and emotional information for complete ease of use assessment of broadened PACMAD.

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