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Modelling an Institutional Mobile Learning Readiness Analyser

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Abstract
Due to the affordability, ease of use and availability of mobile devices, many people in Africa and developing countries have acquired at least a mobile device. The penetration of mobile devices places many learning institution in a position to adopt mobile learning, however there are few tools for measuring mobile learning readiness for an institution. The research work presented by this paper has developed a method or framework to be a tool for measuring the mobile learning readiness. The Kenya Education Network (KENET) e-readiness framework was modified through a logical framework to fit mobile indicators. Staging method used had value 1as least while 4 as the best. An institution of higher learning (University) was used to validate the framework. A survey results used revealed the institution was ready to adopt mobile learning as a means of delivering teaching and learning. The institution scored a mobile learning readiness index of 2.61 above the benchmark of 2.5 set by KENET. The researcher recommends use of mobile learning readiness framework to all learning institutions intending to implement mobile learning.
Keywords: Mobile Learning, Readiness index, Distance Learners, KENET

1. Introduction

Mobile Learning can be defined as any sort of learning that take place when the learner is not at a fixed, predetermined location or learning that takes place anytime and anywhere when the learner takes advantage of the learning opportunities offered by mobile technologies (O'Malley et al.2003). Mobile learning readiness involves institutional readiness (Kashoda & Waema, 2002) and student and faculty ownership, use, and readiness for mobile learning (Corbeil, J. R., & Valdes-Corbeil, M. E. 2007). Many learning institutions in Africa need to assess their readiness despite the facts of high penetrations of mobile devices.

According to Ericsson Mobility Report of June 2013, Africa has 775 million subscribers 27% of the world mobile subscription with a penetration of 75%. Kenya has a mobile penetration slightly above 70% (CCK, 2014) and all Kenyan university students own a mobile device (Ireri & Omwenga, 2014).

In order to evaluate mobile readiness, many factors are used. One of them is technological readiness by the learner, institution and instructors (Wagner, 2005), Technology Acceptance Model (Davis, 1989) and Concerns-Based Adoption Model (Hord, Rutherford, Huling-Austin, & Hall, 1987). The latter two are used when implementing technological new modes of learning but technological readiness is used during planning and designing of an educational technology.

2. Research Question

This research was motivated to answer the question, which indicators are appropriate to determine whether an institution is ready to adopt mobile learning?

3. Methodology

This research survey was done in Kenya, Africa. A Kenyan university was purposefully sampled. The university offers its programs through three main modes, i.e. Day (regular), School-based, and Distance learning. The survey targeted 1800 learners in the selected institution where a sample was obtained. The target population was distributed as follows: - Day and Evening 1000 learners, School based 600 learners and, 200 distance learners. To determine sample size, a formula for computing samples of finite population and also for infinite population as provided for by Kothari (2011) and Mugenda (2008) was used.

For finite population $n = \frac{z^2 p.q.N}{e^2(N-1)+z^2 p.q}$ formula was used. According to Mugenda, the infinite population formula $n = \frac{z^2 p.q}{e^2}$ can be used if population is greater than ten thousands; therefore, since the population targeted is finite the first formula was used to do sampling.

In the formula, n is the sample size desired, z is standard normal deviation at the required confident level, p is the proportion in the target population estimated to have the characteristics, q=1-p and e is the level of statistical significance.

Table 1 summarizes the samples used as computed by the formula.

Table 1: Table of Calculated and Used Samples

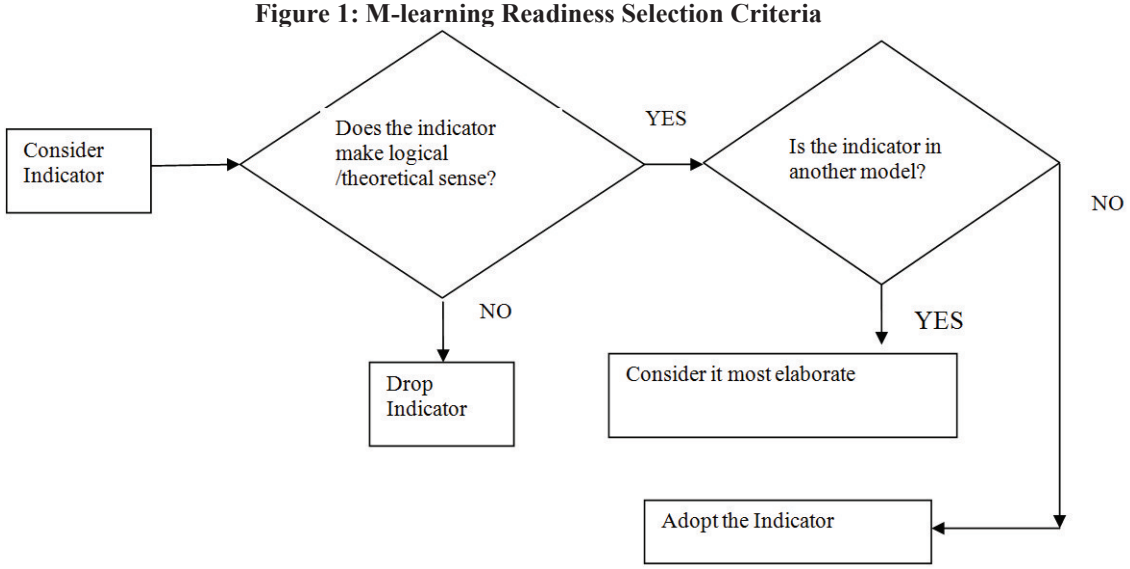
Learners mode	Total number of learners	Calculated sample size	Sample used
Day and Evening	1000	277.24	270
School based	600	234.086	230
Distance learners	200	131.639	130

From table 1, the sampled population was give questionnaires to fill

3.1 Method used in selecting Indicators for Mobile Learning Readiness

The mobile readiness conceptual framework used in this research was derived from Kenya Education Network (KENET) e-readiness framework. The e-readiness framework was the first diagnostic tool to be used in Kenya to assess e-readiness for higher education in the year 2002 (Waema and Kashorda, 2002). It was used to evaluate ICT readiness for 17 universities in Kenya. The five categories used in the e-readiness framework were retained and used by the mobile readiness framework. However, the indicators were modified from 17 to 13. The following criteria was used to select relevant indicators from e-readiness Framework

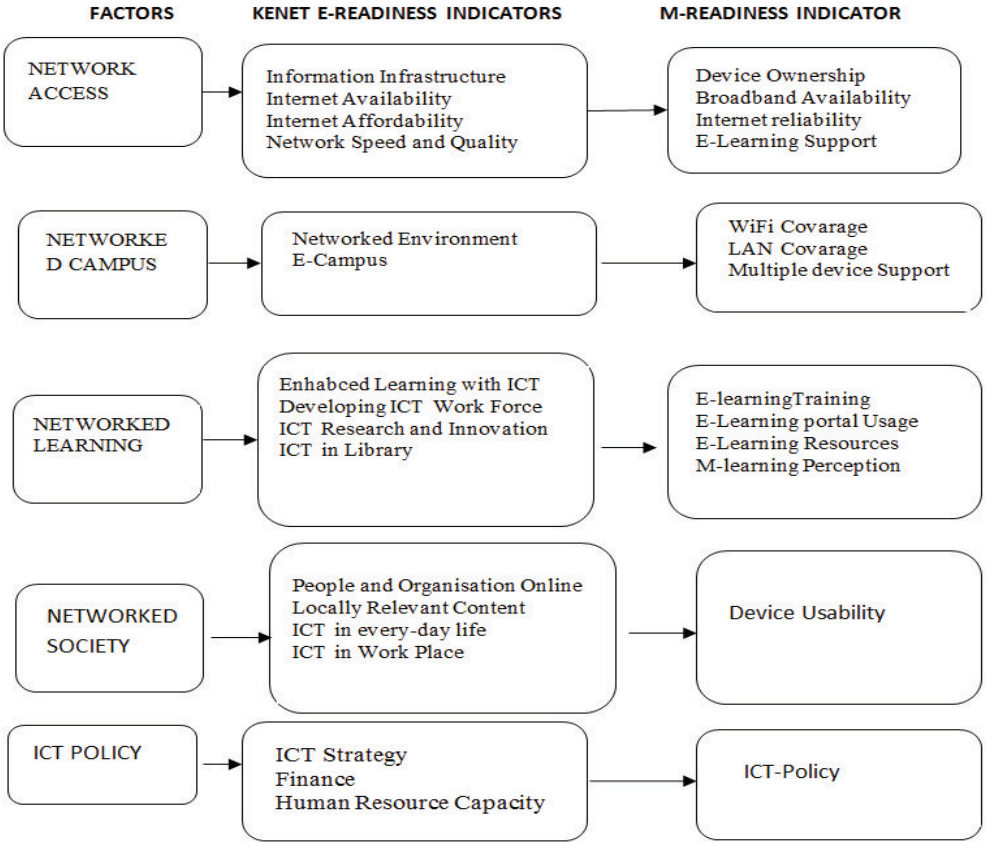
Figure 1: M-learning Readiness Selection Criteria



Author: Researcher

Figure 1 shows the logical flow the researcher used to identify the variables to use in calculating mobile learning readiness from the Kenya Education Network (KENET) e-readiness model. Figure 2 is a summary of factors used by both KENET and researcher, Indicators used by KENET and Indicators used by the reseacher.

Figure 2: E-readiness Framework Modified for Mobile Readiness Framework



Author: Researcher

3.2 Computing M-Readiness indexes

After collecting data on the 13 indicators across the 5 factors, and after staging, the formula $m-readiness = \frac{\sum_{j=1}^{n} W_{ij} e_{ij}}{n}$ was used to compute mobile readiness index. From the formula, **m** is the overall m-readiness value, **i** is mode of study, **j** is each of the 13 indicators, $\mathbf{w_{ij}}$ is relative weights assigned to the 13 measures (j), $\mathbf{e_{ij}}$ is individual score for each measure on a scale of 1 to 4 and **n** is total number of measures (13)

The following algorithm was used to do computations:

Step 1: identification of learning modes
Step 2: data gathered on the 13 indicators for each mode
Step 3: data sorting into numbers of factors (in this case 5 groups)
Step 4: In each category in step (3) along with its indicators
Step 5: examine the first measure of the chosen category. Identify the smallest and the largest values; determine the range by subtracting the smaller value from the larger
Step 6: create a normalized scale for the indicator
i. Divide the range in step (5) into 4 equal intervals
ii. Assign 1 to the smallest number in step (5)
iii. Assign 4 to the largest number
iv. Assign 2and 3 corresponding to the interval data created in step 6(i)
Step 7: compare each learning mode value for the measure against the normalized scale in step (6)
Step 8: assign the closest normalized values for each mode
Step 9: repeat steps (5) – (8) until all indicators for the factor are done
Step 10: compute the weighted average of the values in step (8); this gives the m-readiness value for the given category
Step 11: repeat steps (4) – (10) until all categories are done
Step 12: average the values of all categories in step (10); this gives the m-readiness index for each

learning mode.

4. Results and Discussions

Tables 2,4,6 and 8 shows the raw data obtained from frequencies given by SPSS analytical tool. All figures are in percentages (%). Table 3,5,7 and 9 gives the normalized values of table 2,4,6 and 8 respectively. From the computation, the networked Access index is 2.95, networked campus 2.65, Networked Learning 2.69 and Networked community 2.5.

Table 2: Raw Scores for Network Access

Study Mode	Device Ownership(%)	Internet Availability(%)	Internet Affordability (%)	Internet Reliability (%)	Learning support (%)
RD	93	42	43	30	49
RE	100	33	80	66	33
DL	100	60	60	50	50
SB	100	50	16	50	100

Key: RD= Regular Day; RE= Regular Evening; DL=Distance Learning; SB=Schoolbased

Table 3: Normalised Score index for Networked Access

Study Mode	Device Ownership	Internet Availability	Internet Affordability	Internet Reliability	Learning support	Index (average score)
RD	3	2	2	2	2	2.2
RE	4	1	4	4	2	3.0
DL	4	4	4	3	3	3.6
SB	4	3	1	3	4	3.0
			Networked Access Index			2.95

Table 4: Raw Scores for Network Campus

Study Mode	Wi-Fi Coverage (%)	LAN Coverage (%)	Multiple Device Support(%)
RD	62.1	70.4	44.5
RE	66.7	66.7	33.3
DL	40	40	30
SB	50	50	40

Key: RD= Regular Day; RE= Regular Evening; DL=Distance Learning; SB=Schoolbased

Table 5: Normalised Score Index for Networked Campus

Study Mode	Wi-Fi Coverage	LAN Coverage	Multiple Device Support	Index (average score)
RD	4	4	4	4.0
RE	4	4	2	3.3
DL	1	1	1	1.0
SB	2	2	3	2.3
			Networked Campus Index	2.65

Key: RD= Regular Day; RE= Regular Evening; DL=Distance Learning; SB=Schoolbased

Table 6: Raw Scores for Network Learning

Study Mode	E-learning Training(%)	E-Learning portal Usage (%)	E-Learning Resources (%)	M-learning Perception (%)
RD	63	73	78	71
RE	33	33	67	67
DL	60	60	70	90
SB	50	50	50	100

Key: RD= Regular Day; RE= Regular Evening; DL=Distance Learning; SB=Schoolbased

Table 7: Normalised Scores for Network Learning

Study Mode	E-learning Training	E-Learning portal Usage	E-Learning Resources	M-learning Perception	Index (average score)
RD	4	4	4	1	3.25
RE	1	1	3	1	1.5
DL	4	3	3	3	3.25
SB	3	3	1	4	2.75
			Networked Learning Index		2.69

Key: RD= Regular Day; RE= Regular Evening; DL=Distance Learning; SB=Schoolbased

Table 8: Raw Data for Networked Community and ICT Policy

Study Mode	Networked community – Device preferred mode of communication (%)	ICT policy – policy awareness (%)
RD	23	46
RE	33	66
DL	70	50
SB	50	50

Key: RD= Regular Day; RE= Regular Evening; DL=Distance Learning; SB=Schoolbased

Table 9: Normalised Data for Networked Community and ICT Policy

Study Mode	Networked community – Device preferred mode of communication	ICT policy – policy awareness
RD	1	2
RE	1	4
DL	4	2
SB	3	2
Index(average)	2.25	2.5

Key: RD= Regular Day; RE= Regular Evening; DL=Distance Learning; SB=Schoolbased

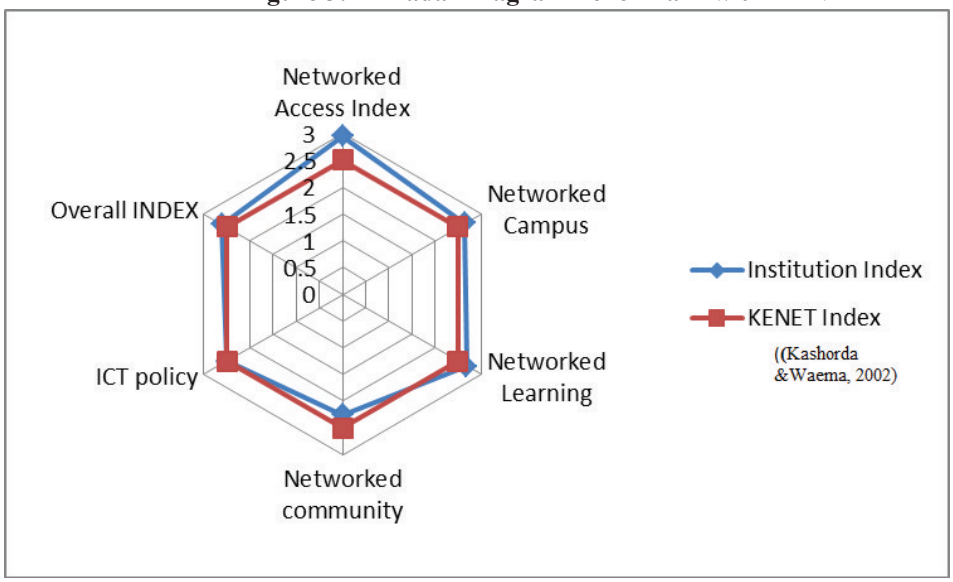
Table 10: M-Learning Readiness Index

Factor	**Index**
Networked Access Index	2.95
Networked Campus	2.65
Networked Learning	2.69
Networked community	2.25
ICT policy	2.5
Overall INDEX	**2.61**

The overall index is computed as an average of all the other indices, with a value 2.61 as indicated on table 10. The benchmark value obtained from KENET report is 2.5 (Kashorda &Waema, 2002, 2008. 2014). Figure 3 shows clearly the radar graph. It is evident from the results that the institution is ready to adopt mobile learning since its mobile readiness index computed from all indexes is 2.61. This value is slightly higher than 2.5, which

is the KENET Benchmark.

Figure 3: Radar Diagram Benchmark with KENET



Author: Researcher

5. Conclusion

The Kenya Education Network (KENET) indicators for measuring e-learning readiness considered readiness for an institution; while the institutional factors considered by this research are same the indicators of e-learning differ slightly from indicators of mobile learning. This research has established through a logical flow and reasoning that mobile learning readiness can be measured using the following indicators:- Device Ownership, Broadband Availability, Internet reliability WiFi Coverage, LAN Coverage, Multiple device Support, Training, portal Usage, Mobile Learning Perceptions Device Usability and ICT-Policy in the institution. From the results, the institution and the learners used in this research, shows that they are ready to adopt mobile learning after meeting the threshold benchmark point. The results obtained after computing the mobile readiness index are of great significance in determining if the institution can adopt mobile learning technology or not. It is important to note that the adoption of mobile learning technology plays a big part of the success to meeting the learning outcomes (Ireri, BN. & Omwenga, EI. 2014). The decision to develop a mobile learning system for an institution, must meet the critical benchmark levels set by educational regulators. It is therefore, the view of the researcher that institutions that wish to implement mobile learning use this framework/model to conduct an analysis of the mobile readiness before implementing one.

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