Assessment of ICT integration into instruction in Teacher education institutions in Kenya

Bernard Chemwei; Sharon J. Koech and Sarah C. Lang'at

Kabarak University, Kenya

- ICT is transforming various aspects of human activity . A new global economy powered by technology, fuelled by information, and driven by knowledge has been created. Technology has changed the way people live, communicate, work, and play. They have brought about highly important transformations in agriculture, medicine, engineering and other fields .

- In Kenya, there have been calls for education reform to improve the quality of education to adequately prepare students in the work place . The ministry of education heeded the call and developed the Sessional paper no 1. of 2005 which appreciates and recognises the critical role that ICT plays in helping education deliver its mandate.

- The availability of ICT facilities over the past few years have increased substantially in most learning institutions in Kenya . Teacher training colleges have been great beneficiaries of donations and investments of ICT equipment.

- It is estimated that teacher training colleges have an average of 60 computers each with Internet connectivity. Most of the trainers in these colleges have been inducted on ICT integration in instruction

- There is a growing concern among stakeholders that the rate at which these technologies are integrated into the teaching and learning process is slow . Many teachers shy away from incorporating technology into their teaching and learning process despite the availability of computers in schools.

- Many teacher-educators in primary school teacher training colleges are not yet incorporating these technologies into their instruction in ways that make a difference in learning. Perhaps that is why most new teacher education graduates still have limited knowledge of how ICT can be used in their professional activities (Kinuthia, 2009). Yet integrating ICT in the educational system will lead to improved outcomes for the students. It therefore follows that placement of ICTs in classrooms is not equal to the effective integration for teaching and learning (Earle, 2002).

- Teacher-training is one essential requirement for successful use of ICT in education. Teacher preparedness and professional development is necessary for the success of learners, school and educational systems.

- Teacher-educators need to be effective teachers and good role models for teaching practices because it is not possible to prepare a new generation of teachers who can effectively use new tools for learning unless teacher-educators themselves are models for effective use of technology in their own classes .

- If student-teachers are to become confident users of technology in their own classes, then they need to see their tutors use them in instruction. Tutors cannot model the use and integration of technology in their teaching if their knowledge, skills, and attitudes towards technology integration are low.

- The potential benefits of ICT integration have been promoted by a number of international organizations such as IDCR, Intel, Nepad, UNDP, and USAid.

- Research is needed to ensure that such organizations can benefit from practical information related to effective integration.

- Information on teacher-educators' levels of ICT integration in Kenya is scanty. Such information is necessary for the government to develop a realistic plan to achieve its dream of having a technologically literate workforce and being industrialised by 2030. It is on the basis of this background that this study was designed to establish teacher-educators' level of ICT integration in teacher training colleges in Kenya.

STATEMENT OF THE PROBLEM

- Despite the Kenyan government, the private sector and non governmental organisations donating computers to teacher training colleges, it is not clear whether teacher-educators are integrating them as instructional tools in the teacher education curriculum.

- Besides, there is no documented evidence indicating the level of integration of ICT in instruction in primary teacher training colleges in Kenya.

- For without the knowledge and experience of ICT within the teaching fraternity, it would be difficult to realize its impact on the pupil's learning. This study was designed to contribute in this regard by investigating the level of ICT integration by teacher-educators in primary teachers training colleges.

Research Objectives

- 1. To determine the frequency teacher-educators' integration of ICT resources in their classroom instruction

- 2. To examine the teacher-educators' overall level of ICT integration into instruction

- 3. To identify the teacher educators' characteristics in relation to their level of ICT integration

. METHODOLOGY

The Research Design

- Descriptive survey design was used. Through using a survey, a careful investigation of the phenomena through collection of a large amount of data from teacher educators in different TTCs was possible in a relatively short period of time. From the sample results, the researcher can generalise the findings to the population especially if the population is too large.

The Study Location

- The study was carried out in six public primary teacher training colleges in Kenya.

- PTTCs made a good research population because of the Government's commitment to improve PTE to make it more relevant to the needs of the country in tandem with international trends.

- The colleges were Eregi, Mosoriot, Kilimambogo, Muranga, Machakos, and Baringo TTCs.

- Primary TTCs were chosen because there have been initiatives by the Government to integrate ICTs in teaching in teacher education.

The Study Population

- The target population for this study consisted of 18 fully operational primary teacher-training colleges and the entire teacher-educators in Kenya.

- All colleges have computer laboratories and are making efforts to improve their ICT capacity.

- Teacher-educators were selected because they are the actual implementers of ICT integration policies in teacher education programmes.

Sample and Sampling Techniques

- The study employed the simple random sampling to select the six colleges out of the eighteen fully operational colleges that offer certificate of primary education course.

- Simple random sampling was also used to select a sample of 204 tutors from the total 1299 tutors in all TTCs.

- Purposive sampling method was used to select the 36 heads of departments and the 6 principals.

Data Collection Procedures

- Permission to carry out the research was sought from the National Council for Science and Technology and the principals of the teachers colleges.

- Afterwards, the questionnaire was administered to the teacher-educators and interviews conducted with the heads of departments and the principals.

Data Analysis

- Data collected using the questionnaire was analysed using descriptive statistics namely frequencies, means, standard deviations, tables and percentages.

- Information from interviews and observation were recorded and transcribed verbatim.

4. RESEARCH FINDINGS

Teacher-educators' Level of ICT Integration in Instruction

- Teacher-educators asked to indicate how often they used the 14 selected computer applications as instructional tools in the subjects they taught.

- The findings are illustrated in Table 1 below.

Table 1: Frequency of Teacher-educators' usage of ICT in instruction

Level of integration					Percentage
Computer tool	Never	rarely	sometimes	often	quite often
1. Word Processing	16.9	21.7	23.5	19.9	18.1
2. Spreadsheets	33.9	24.2	20.6	12.7	8.5
3. Database management	36.2	25.8	26.4	6.7	4.9
4. Classroom management	32.1	21	23.5	14.8	8.6
5. Graphic images for learning	46.9	27.2	18.5	4.9	2.5
6. PowerPoint	44.7	22	17	6.9	9.4
7. Desktop publishing	46	28.8	16.6	6.7	1.8
8. Interactive multimedia materials	56.1	23.8	11.0	7.3	1.8
9. CD-ROMs and DVDs	25.3	19.3	29.5	15.1	10.8
10. Internet	25.1	11.4	29.3	19.8	14.4
11. E-mail for communication	38.8	20.0	22.4	9.1	9.7
12. Simulations for my teaching	64.2	17.3	11.7	5.6	1.2
13. Drill and Practice programs	64	23.8	5.5	4.3	2.4
14. Computer tutoring applications	47.9	20.6	16.4	9.1	6.1

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- The most frequent use of ICT in instruction are word processing (37.2 % "often" or "very often"), Internet (34.2 % "often" or "very often"), CD ROMs or DVDs (25.9 % "often" or "very often"), and data bases for keeping records (25.4 % "often" or "very often").

- On the other hand, the least use of computers for instructional purposes are computer simulations and games (64.2 % "never"), Drill and Practice programs (64 % "never") and interactive multimedia materials (56 % never).

- From the descriptive analysis above, it is apparent that teacher-educators have high levels of ICT integration for such ordinary applications as word processing, Internet, and CD or DVDs, but have low levels of ICT use for more specialised applications as computer assisted instruction such as drill and practice, tutorials as well as simulations and games. This means that knowledge in advanced computer skills is quite low.

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- Interviews with HODs and principals confirmed that Word Processors, PowerPoint presentations and CD-ROMs were frequently utilised by teacher-educators.
- Word processors were mostly used to type exams, to prepare teaching notes, schemes of work, and class assignments.
- The directors of studies used computers to produce transcripts for teacher trainees.
- Few teacher-educators used internet effectively. Most of those who used the Internet were mainly from the ICT departments who contended that the wealth of information available was wonderful and could be used to supplement what was provided in course books.
- They agreed that the information in the web was quickly available and may not be found elsewhere. One notable hindrance to the integration of Internet in instruction is lack of adequate Internet connectivity in the colleges. They mostly use Modems which they claimed were quite unreliable and expensive to maintain.

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- An observation made by the researchers on the computer applications which were mostly utilized showed that Power Point Presentation software was used by a few teacher-educators, especially in the ICT departments. Teacher-educators argued that the process of creating a presentation was quite involving. That is why a few of them applied them in instruction.

- They agreed that when provided with ready made slides they used them effectively in delivery of content to student-teachers because it saved class time and reduced the amount of text that is written on the chalkboard. A great proportion of the teacher-educators preferred using the chalkboard to computers.

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- Most of the teacher-educators used video simulations during micro- teaching. For example, language teachers used them to correct errors in pronunciation and to model sounds to teacher trainees.

- A few of teacher-educators used the spreadsheets software for keeping grades and students records. However, drill and practice software which allows students to repeat topics or units until mastery was gained, were not used by teacher-educators. They said it was cumbersome to use it. On the other hand the e-mail which can be used to enhance communication or correspondence amongst teacher-educators was hardly used as a teaching tool. Perhaps it is because of lack of access to the Internet connectivity.

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- There is a clear indication that teacher-educators have high levels of ICT integration in three mainstream applications: Word processing, Internet and CDs /DVDs, but have low levels of ICT integration for more specialized applications.

- This pattern of ICT integration validates Keengwe's (2007) findings which found that the use of more mainstream and personal computer applications was common among Faculty and teachers.

- But the level of ICT integration in general by teacher-educators remained very low. One probable reason for this reality is the fact that specialized applications increase the complexity of an innovation. This also echoes Rogers' (2003) theory of diffusion of innovations which states that the complexity of an innovation is a hindrance to integration. In most cases, mainstream applications are believed to be compatible with the adopter's existing values.

- Other studies whose findings concur with these findings include that of Sahin and Thomson (2006) which found that Turkish Faculty members use traditional technologies more often because they lacked the experience in the use of more complex computer related technologies. They also found the word processor is the most frequently used computer application among the Faculty members. From the interviews conducted with the HODs and principals, several reasons can be attributed to the low level of ICT integration in TTCs. These include: lack of working computers among teacher-educators; lack of experience in ICT use; low levels of access to ICT resources, lack of technical support from the college administration, age of tutors, and low ICT skills.

Overall teacher- Educators' Level of ICT integration into instruction

- To gain more insight into the extent of integration, an attempt was made at calculating an overall mean score of the level of ICT integration into teaching.

- An index for determining the teacher-educators' integration level was developed. It was established that the highest score that the respondents attained in all the 14 computer applications was 64. Hence the range was set between 0-64. This was divided against the three levels of ICT integration. That is; low, moderate and high integration levels.

- Those who scored 21 and below fell in the low level of integration; between 22 and 42 fell in the moderate level; and those scoring between 43 and 64 were in the high level of ICT integration. The descriptive statistics related to the level of ICT integration are represented in Table 2.

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- **Level of integration**   **Responses**   **%**

- Low integration   106   62.7

- Moderate integration   51   30.5

- High integration   10   5.9
- Others   2   1.2

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- From Table 2 show that the teacher-educators' overall level of ICT integration in teaching is very low.

- Majority of the teacher-educators 106 (63.5 %) fall in the category of low integration while 51 (30.5%) are in the moderate integration level and only 10 (5.9 %) have high integration levels. In general there is a low level of integration in all teachers' training colleges.

Teacher characteristics in relation to their level of ICT integration

- It was deemed necessary to compare the level of ICT integration into teaching in relation to teacher-educators characteristics. Table 3 below gives a summary of the analysis.

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Characteristics	ICT integration level %		
	Low	**moderate**	**High**
• **1. Gender**			
• Male	58.3	36.5	5.2
• Female	71.1	23.2	5.8
• **2. Age**			
• 25-30 years	28.6	42.9	28.6
• 31-35 years	26.1	43.5	30.4
• 36-40 years	71.2	28.8	0
• 41-45 years	73.3	24.4	2.3
• 46-50 years	66.7	33.3	0
• 51 years and above	75.0	25.0	0

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3. Departments

Department			
Creative arts	65.2	34.8	0
Education	88.9	11.1	0
ICT	0	53.8	46.2
Integrated science	57.1	42.9	0
Mathematics	60.0	26.7	13.3
Sciences	68.8	25.0	6.3
Social sciences	57.1	42.9	0
Languages	75.0	22.7	2.3

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- **4. Level of education**
- Doctorate 0 0
  100
- Masters 63.1 35.4
  1.5
- Bachelors 72.1 24.4
  3.5
- Diploma 21.4 42.9
  35.7
- **5. Teaching experience**
- 1-5 years 15.4 61.5 23.1
- 6-10 years 47.4 26.3 26.3
- 11-15 years 75.5 22.4 2
- 16-20 years 72.7 27.3 0
- 21-25 years 53.6 42.9 3.6
- 26-30 years 80 20 0
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- A majority of the female respondents (71 %) were in the low level of ICT integration as compared to (58.3 %) males.

- Furthermore, 36.5 % of the males were in the moderate level as compared to 23.2 % females. 5.2 % of the males were in the high level of integration compared to 5.8 %.

- Implication: female teacher-educators are slightly behind their male counterparts in their levels of ICT integration into instruction.

Age

- The younger teachers in the age bracket of 25-30 years seem to have higher integration levels with 42.9 % and 28.6 % in the moderate and high levels respectively.

- A similar scenario is depicted in the case of those in the age bracket of 31-35 years with 43.5 % and 30.4 % of the respondents in the moderate and high levels respectively.

- Conversely, the older teacher-educators in the age bracket of 46-50 years and over 51 years have very low levels of ICT integration with 66.7 % and 75 % respectively in the low bracket of integration.

- Age is an important factor in ICT integration. In effect, this observation agrees with earlier research findings indicating that age has a negative relationship with ICT integration (Na, 1993). Perhaps this could be because of the acknowledged fact that ICT has a potential to intimidate older teachers. Possibly, this is because older teacher-educators have low computer literacy levels and at the same time prefer using traditional method of talk and chalk.

Department

- Teacher-educators in the departments of education (88.9 %), languages (75 %) and creative arts (65.5%) are in the low level of integration.

- But teacher-educators in ICT (46.2 %), mathematics (13.3 %) and sciences (6.3 %) seem to have relatively higher levels of ICT integration. These differences are as a result of ICT access and training. Teacher-educators in the ICT department have higher access to computer facilities and better training and hence use them in teaching about the subject as well as in teaching other subjects.

- The relatively high use in Science and Mathematics departments could be as a result of SMASSE influence. The SMASSE program which is sponsored by JICA has trained tutors on ICT integration on some occasions.

Level of education

- Teacher-educators' level of education does not seem to influence ICT integration a lot. This is because as shown in Table 4.9 above, teacher-educators with Bachelor's degrees and Master's degrees are in the low level of integration 72.1 % and 63.1 % as compared to their Diploma counterparts who have a high number in the high level of integration (35.7 %).

- Teacher-educators holding Diploma certificates seem to have higher integration levels perhaps because computer education was initially offered in Diploma colleges at the Kenya Science Teachers College and the Kenya Technical Teachers Training College. It can therefore be concluded that teacher-educator's ICT integration is not academic qualification specific.
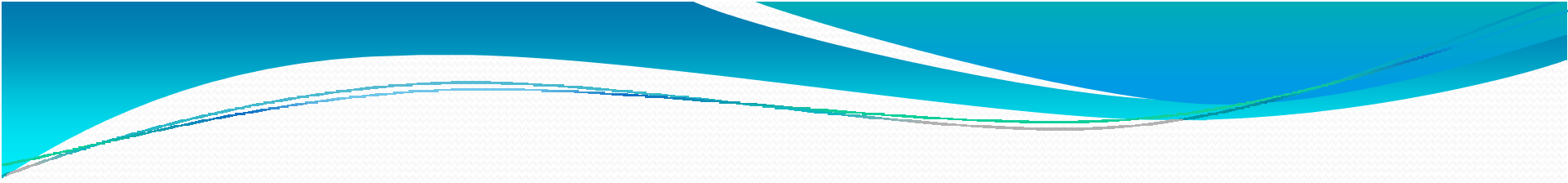
Teaching experience

- Teacher-educators with many years of teaching have very low levels of integration. For instance eight out 10 of those with 26-30 years of teaching and about half of those with 21-25 years of teaching are in the low level of ICT integration.

- On the contrary, teachers with few years of teaching have high levels of integration. This is because those who fall in the age bracket of 1-5 years had about a quarter of teacher-educators in the high level of integration while those in the age bracket of 6-10 years had 26.3 % of the teacher-educators in the high level of integration.

- This corroborates recent findings showing that the fewer the years of teaching, the higher the knowledge and ICT use for instruction. Perhaps this is because of the openness of the youth to innovations (Teczi, 2010).

5. CONCLUSION

- Thus, the research concludes that while ICTs are integrated in teaching in primary school teachers' training colleges in Kenya, their level of integration is quite low. There is a moderate integration in use of such typical computer applications such as word processing, Internet, and CDs/DVDs, but have low levels of ICT integration for more specialized applications as drill and practice, tutorials, and simulations and games.

- Both male and female teachers were found to be in the low level of integration.
- But as for age, the younger teacher-educators had higher integration levels than the older teacher-educators.
- Higher levels of ICT integration were seen in the ICT, Science, and Mathematics departments.
- Teacher-educators with Diploma in Education certificates had higher integration levels than those with degrees. Moreover, in terms of teaching experience, those respondents with less teaching experience integrated ICTs better than those with many years of teaching.

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- Factors contributing to the low level of ICT integration in teacher preparation include: teacher-educator's age; availability of ICTs resources; lack of ICT skills to integrate ICTs in teaching, appropriate software, lack of prior experience to use it, and lack of Internet facilities, and lack of confidence among teacher-educators.

Recommendations

- Basing on the findings and conclusions of this study, the study recommends the retraining of teacher-educators to ensure that they have sufficient skills to integrate ICT in teaching their specific subjects.

- The ministry of education should make ICT part and parcel of the undergraduate degree courses in universities where teacher-educators are trained. This will equip all graduates who get to teach in TTCs with ICT skills so that they can model and integrate ICTs into teaching to serve as models to teacher trainees who would probably adopt their pedagogies in their future classrooms.

- Colleges should use tutors experienced in ICT integration to train those whose skills are low. Their efforts can then be rewarded through small tokens.

- Furthermore, college principals should be trained on ICT integration and strategic planning for effective integration of ICT in colleges. This will enable them to provide guidance and support to teacher-educators.

THANK YOU

- FOR LISTENING