

Factors Influencing Integration of Information and Communication Technologies in Public Primary Teacher Training Colleges in Central Region of Kenya

¹ Vitalis O. Gode, ² Felix M. Obegi, ³ Alice Macharia

¹ Lecturer Department of ICT, Kilimambogo Teachers Training College,

² Lecturer Department of Management Science, Egerton University,

³ Associate Deputy Vice Chancellor, Resource Management, at Kenya College of Accountancy University

vitalisgode@gmail.com, obegijnr@gmail.com, alice@kca.ac.ke

ABSTRACT

The growth of the global economy and the information based society has pressured education systems around the world, to use technology, to teach students the knowledge and skills they need. This study investigated factors influencing integration of ICT in Public Primary Teacher Education. The objectives of the study were to investigate the extent to which Public Primary Teacher Training Colleges (PPTTC) in the central region of Kenya have integrated ICT in teaching and learning process, the challenges facing the integration of ICT in Primary Teacher Education and to establish the factors influencing integration of ICT in primary teacher education. The study was carried out in four (4) PPTTCs located in the central region of Kenya with a target population of 261 academic staff from which 176 respondents were picked using proportionate sampling. Data was collected using questionnaires and interview schedules. It was analyzed using descriptive statistics: Statistical Package for Social Sciences (SPSS) version 17 and presented with help of frequency table, graphs and percentages. The study found that the factors that influenced integration of ICT in the primary teacher training colleges were: adequacy of internet connectivity, adequacy of computer hardware, adequacy of computer software, maintenance of ICT infrastructure, and training of personnel in ICT, teacher workload, teacher gender, teacher age, and presence of ICT policy and adequacy of funds. The study therefore recommends that PPTTCs should develop strategies to identify strengths and weakness of various technological resources as well as an evaluation framework. Teacher trainers should also be provided with regular trainings and seminars on how to integrate ICT in teaching and learning process and adopt policies that enhance integration of ICT in the teaching and learning process.

Keywords: *ICT, TPCK, Public Primary Teacher, Training College*

1. INTRODUCTION

The growth of the global economy and the information based society has pressured education systems around the world to use technology to teach students the knowledge and skills they need [17]. It is assumed that integration of ICT brings revolutionary changes in teaching methodologies. The innovation lies not in the introduction and use of ICT, but in its role as a contributor towards students-centered form of teaching and learning [15]. Integration of ICT provides the tool needed by the information knowledge society. Thus, teachers are inevitably presented with the demand to integrate ICT to empower learners in this digital era. ICT allows us to collaborate, create, collect, store, disseminate, knowledge and resources all over the world. With skills in ICT becoming a necessity that individuals have to acquire, educational institutions are strapped with the burden to provide a conducive environment to help the learners in the pivotal roles they are going to play in the knowledge and digital economy [19]. By integrating ICT during regular classroom instruction, teacher trainers demonstrate to the trainees the innovative ways of teaching and learning [15]. In Kenya learning institutions are under pressure to integrate ICT in the process of teaching and learning arising from the vision 2030 document, national ICT policy on education and the laptop project for primary schools. This study therefore was set to establish factors that influence integration of ICT in Public.

Teacher Training Colleges in Kenya guided by the specific objectives:

- i) Examine the extent to which primary teacher training colleges have integrated ICT in teaching and learning.
- ii) Establish challenges primary teacher training colleges face in integration of ICT in teaching and learning.
- iii) Determine the factors influencing integration of ICT in primary teacher training teacher colleges.

The study was guided by the following research questions:

- i) To what extent have primary teacher training colleges integrated ICT in teaching and learning?
- ii) What challenges do primary teacher training colleges face in integration of ICT in teaching and learning?
- iii) What factors influence integration of ICT in primary teacher training teacher colleges?

2. SIGNIFICANCE OF STUDY

Today's technologies are essential tools for teaching and learning. To use these tools efficiently and effectively, teachers need vision of the technologies potential, opportunities to apply them, training and just-in-time support and time to experiment. Only then can

<http://www.cisjournal.org>

teachers be informed and confident in the use of new technologies [2]. This study would serve as useful reference material to the Ministry of Education and Teachers Service Commission in assessing the impact of continued investment in ICT and inform policy formulation that would be helpful in successful integration of ICT in teacher training colleges in Kenya. Also it would arouse interest and stimulate further research in the area of education in the integration of ICT as a tool in the process of teaching and learning. In addition, the study would provide information on the extent to which integration of ICT prepared the teacher and the trainees for the world of technology.

3. RELATED WORK

ICT use in education is a particularly dynamic stage in Africa [16]. In Kenya, integration of ICT in education is still at limited stage [9]. The NEPAD initiated pilot projects on ICT usage in Kenya is only in primary and secondary institutions. Omwenga et al., [11] did a study on how ICT provides a window of opportunities for educational institutions and other organizations to harness and use ICT to complement and support the teaching and learning in Kenya. [12] studied the framework of evaluating ICT use in primary teacher education in Kenya and investigated barriers on the integration of ICT in general issues. However, the studies did not look into the factors influencing integration of ICT in primary teacher education which the researchers of this study sought to investigate. The study was based on the theoretical formulation of the TPCK model whose aim entails the understanding and negotiating of the relationship among three knowledge components, namely Technology, Pedagogy and Content. This model was

developed by Koehler and Mishap [6] for making decisions on integration of ICT that causes the representation of new concepts and requires developing sensitivity to dynamic, transactional relationship between all the three components so as to enhance effective and meaningful teaching and learning process. The components of the TPCK model are the following:

- T – Technology encompasses modern and varied technologies such as computers, internet, digital video and common place technologies including projectors, interactive boards and books. By understanding their specific affordance and constrains, the teacher is able to determine when and which technology to use.
- P – Pedagogy describes the collected practices, process, procedures and methods of teaching and learning. It includes knowledge about the aims of instruction assessment and learning as well as how learners acquire skills.
- C – Content is the actual subject matter that is to be learned or taught.

Technology integration entails the understanding and negotiating of relationship among the aforementioned three components. Good teaching is not simply adding technology to the existing teaching and content domain. Rather, the introduction of technology causes the representation of new concepts and requires developing sensitivity to the dynamic, transactional relationship between all three components suggested by the TPCK framework [6]. This can be easily understood in illustration in figure 1.

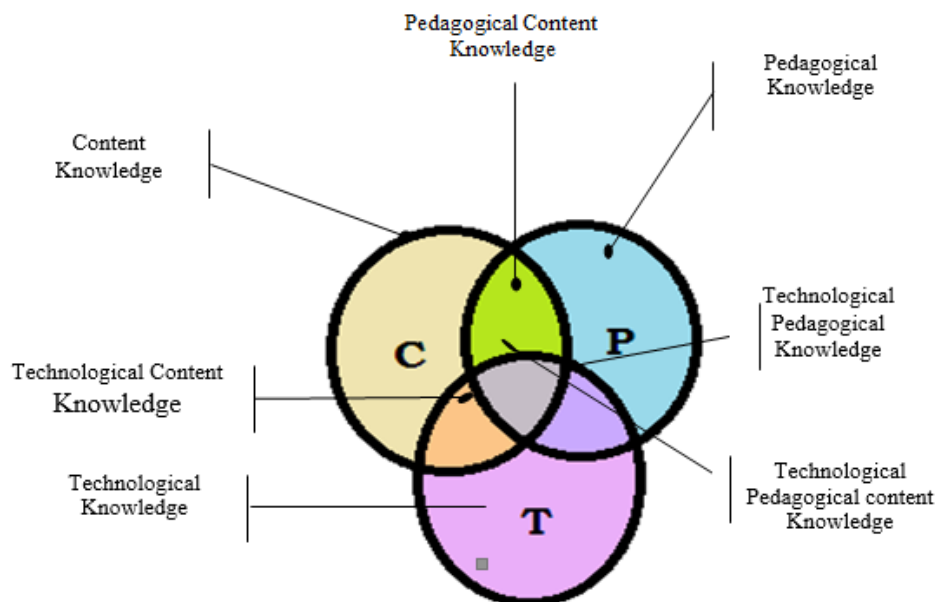


Fig 1: Theoretical framework

Source: Koehler and Mishap [6]

<http://www.cisjournal.org>

4. RESEARCH DESIGN

The study adopted a descriptive survey design which was both quantitative and qualitative in nature. [7] describes descriptive survey design as a rigid design which focuses attention on formulation of objectives, designing methods of data collection, selecting the sample, collecting the data, processing. A descriptive research determines and reports the way things are, besides attempting to describe such things as possible behavior, attitudes, values and characteristics [8]. It was therefore appropriate in collecting data regarding opinions, perceptions and experiences of trainers and administrators of the teacher training colleges. The study adopted the descriptive survey study design since it would describe the extent to which PTTC have integrated ICT in the process of teaching and learning, describe the challenges PTTC face in integration of ICT in the process of teaching and learning and describe the factors influencing

integration of ICT in PTTC. The study was carried out in Central region of Kenya. The region covers four (4) public PTTC's. According to the Kenya National Examination Council Primary Teacher Education results for the year 2012, the colleges in the county were among the top 10 in rating out of the 22 PTTC in the country. They were also ideal setting for the researcher's interest, ease of access and good rapport with the participants for easy data collection just as [10] observes. The researcher targeted 261 academic staff (teacher trainers and administrators) in public PTTC's in Central region of Kenya covering the counties of Kiambu, Muranga and Nyeri as presented in Table 1. All public PTTC's have similar characteristics and are managed through eight (8) departments namely administration, creative arts, education, ICT, languages, mathematics, Science and Social sciences.

Table 1: Distribution of Target Population in PTTC in Central Region

Department	Kamwenja	Kilimambogo	Muranga	Thogoto	Total
Administration	4	4	4	4	16
Creative Arts	15	13	11	10	49
Education	6	11	6	7	30
ICT	4	5	4	4	17
Languages	16	16	10	13	55
Mathematics	6	7	5	4	22
Science	9	8	8	7	32
Social Science	13	11	7	9	40
Total	73	75	55	58	261

Source: Ministry of Education (2012)

4.1 Sample Size and Sampling Procedure

Sampling is the process of selecting individuals for study. From the target population of 261 the study targeted 174 respondents rounded off to the next whole number as determined by Yamane formula, $n = \frac{N}{1 + Ne^2}$ where; "n" is the sample size, "N" is the target population and "e" is the error margin of 0.5, while taking confidence level of 95% [5]. As [4] suggests, using

proportionate allocation, the 174 respondents were proportionately distributed to the four (4) colleges and further to the respective eight (8) departments in each college as outlined in Table 2. By simple random sampling, respondents were selected from their respective departments. Simple random sampling gave each member an equal and independent chance of being selected to be part of the study [13].

Table 2: Sampling grid

Department	Kamwenja	Kilimambogo	Muranga	Thogoto	Total
Administration	3	3	3	3	12
Creative Arts	9	8	7	7	31
Education	4	7	4	5	20
ICT	3	4	3	3	13
Languages	10	10	7	8	35
Mathematics	4	5	4	3	16
Science	6	5	5	5	21
Social Sciences	8	7	5	6	26
Total	47	49	38	40	174

[20], states that in order to carry out a research, a researcher should use methods which provide high

accuracy, general liability and explanatory power with minimum management demands while upholding

<http://www.cisjournal.org>

administrative convenience “the qualitative research uses multi-techniques for data collection in order to obtain holistic view of the researcher”. This study therefore collected data using two instruments namely: questionnaire and interview schedules. The instruments supplemented each other to close the gaps which would be left if only one instrument was used. The researcher was guided by the study objectives when constructing these instruments.

5. RESULTS

A total of 174 out of the 261 respondents were sampled to represent the target population. 162 questionnaires were administered and 12 interviews purposed to be conducted. Of these, 140 questionnaires were returned while eight (8) interviews were conducted.

5.1 Examine the Extent to which Primary Teacher Training Colleges have Integrated ICT in Teaching and Learning

The findings of this study show that a large number of teacher trainers did not have access to computers to aid the teaching/learning process and this consequently imply that teacher trainers did not have access to the internet due to poor network coverage. This is why [18] notes that access to hardware is not only important but also the use of suitable kind of tools and program to support teaching and learning. That the teacher trainers in their colleges were either average or below average when it came to handling computers, hence had little exposure with computers and computer related technologies. Given that curriculum delivery was mostly done in classrooms one would be justified to say that computer related technologies were to a large extent not aiding curriculum delivery in the teacher training colleges. The findings of this study concurs with [14] study on factors influencing integration of ICT In Higher Education in Vietnam which showed that there was a disappointingly slow uptake of ICT in education even though high investments were put in place in improving access to technologies and improving skills of teachers whereas [1] observes that computers have not transformed teaching practices.

5.2 Challenges Primary Teacher Training Colleges face in Integration of ICT in Teaching and Learning

The findings of the study revealed some of the challenges such as; computers were inadequate, there was high work load in integrating ICT in teaching and learning, lack funds which posed a challenge in integrating ICT in teaching and learning, lack of interest among staff presented a challenge in the adoption ICT in teaching and learning, lack of opportunity for ICT training in the college causing a challenge to the adoption of ICT in learning and teaching in the college, most teacher trainers were involved in policy to a small extent and there were no policy guide on integration of ICT in teacher training colleges. These findings concurs with a study carried out by [2] on the main barriers and possible enablers of ICTs into pre-service teacher education

programs which also indicated lack of resources, inadequate training, insufficient technical support, lack of time and visions concerning technology integration learning and knowledge. This shows that such challenges are experienced elsewhere and therefore strategies need to be put in place to curb them.

5.3 Factors Influencing Integration of ICT in Primary Teacher Training Teacher Colleges

The study revealed a myriad of factors influencing integration namely; the training of personnel on ICT influenced adoption of ICT, adequacy of computer software influenced adoption of ICT in the process of teaching and learning, adequacy of storage was another factor that influenced adoption of ICT infrastructure for the process of teaching and learning, maintenance of ICT infrastructure also influenced adoption of ICT infrastructure in the colleges, and adequacy of internet connectivity influenced adoption of ICT. The study also found that teacher workload was another factor that influenced adoption of ICT infrastructure and presence of ICT policy affected adoption of ICT in teaching and learning process. These findings are supported by a number of earlier studies on ICT infrastructure in PTTCs [4]. Most of these studies pointed out ICT infrastructure as the major challenge in mainstreaming ICTs in education [4]. The problem is exacerbated by the fact that most of the institutions had computers as the only available ICT infrastructure.

6. SUMMARY OF KEY FINDINGS

The study shows that extent of integration of ICT in the process of teaching and learning is about 37%, since 62.14% by gender and 62.86 by age reported that they had not adopted the use of ICT in the process of teaching and learning. This was because 71(50.76%) teacher trainers said they never used computers or their accessories in teaching and learning and that 14(10%) teacher trainers used computers and their accessories once a year in the teaching and learning processes. This meant that a proportion of 62.14% of the teacher trainers had either never used ICT in the teaching and learning process or used it once a year in the teaching and learning process. Out of 140 respondents, 87(62.14%) teacher trainers said they did not used ICT in teaching and learning. This showed that more than half of the teacher trainers were not using the ICT in delivery of the curriculum content. The reason why the teacher trainers hardly integrated ICT in the teaching and learning process was because they had not received training on ICT. Out of 140 respondents, 118(84.29%) teacher trainers said that they had never been given any training on ICT. The study also found that the classrooms had not been endowed with ICT equipment to aid process of teaching and learning. For instance out of the 136 teacher trainers who used the computer and related technologies, only 16 (11.43%) used them in the classrooms. Given that the classroom is the place where a lot of the teaching and learning process takes place, it can be established that ICT was not well incorporated in the delivery of the curriculum in classrooms. This is collaborated well by administration

<http://www.cisjournal.org>

perspective which showed that only 12.5% use computers and related technologies during teaching and learning process.

The study established that the teacher training colleges were faced with the challenge of inadequate computers in the college. Out of 140 respondents, 94 (67.14%) teacher trainers reported that the computers were inadequate in the college. The study established that 2 (25%) administrators reported that colleges faced the challenge of lack of expertise necessary for the integration of ICT in the teaching and learning process and that another 2 (25%) administrators reported that teacher training colleges were faced with the challenge of high work load for the teachers which prevented them from integrating ICT in teaching and learning process. Further, the study established that the teacher training colleges were faced with the challenge of lack of interest among the teacher trainers as well as the students in ICT which posed a challenge in the process of integrating ICT in the teaching and learning process. This was according to the views of 2 (25%) administrators interviewed. The study established that there was lack of training opportunities for the staff on how to integrate ICT in the process of teaching and learning which is a challenge facing primary teacher training colleges in integrating ICT in the process of teaching and learning.

This was according to the views of 2 (25%) administrators. The study also found that there was lack of proper ICT policy for guiding the process of integrating ICT in the teaching and learning process. A total of 78 (52%) teacher trainers reported that the colleges did not have ICT policies to guide the process of integrating ICT in teaching and learning. The study further found that the colleges were faced with the challenge of lack of government support in training of ICT skills. A total of 47 (31.33%) teacher trainers reported that the government supported training of ICT skills to a small extent, 23 (15.33%) reported that the government supported the training of ICT skills to a very small extent whereas 4 (2.67%) teacher trainers reported that the government didn't in any way support the training of ICT skills. Other challenges that hampered the process of integrating ICT in the process of teaching and learning were: lack of specific software to aid in teaching and learning specific subjects, lack of computers for accessing educational materials and lack of interest among trainees when computers were used in teaching and learning.

The study found that adequacy of internet connectivity influenced adoption of ICT. A total of 36 (25.71%) teacher trainers reported that adequacy of internet connection influenced adoption of ICT in the colleges to a very large extent whereas 33 (23.57%) teacher trainers reported that adequacy of internet connection influenced adoption of ICT in teacher training colleges to a large extent. The administrators confirmed that limited availability of internet connection impedes the adoption of ICT for delivery of the curriculum content in the teaching and learning process. The study also found

that adequacy of computer hardware also influenced adoption of ICT in the primary teacher training colleges.

A total of 25 (17.86%) teacher trainers reported that that adequacy of computer hardware influenced adoption of ICT in the colleges to a very large extent whereas 34 (24.29%) teacher trainers reported that adequacy of computer hardware influenced adoption of ICT in teacher training colleges to a large extent. The administrators implied that with adequate computer hardware the college could have good software because it is on the hardware that computer software run on. The study further found that adequacy of computer software influenced adoption of ICT in the process of teaching and learning. A total of 31 (22.14%) teacher trainers reported that that adequacy of computer software influenced adoption of ICT in the colleges to a very large extent and 37 (26.43%) teacher trainers reported that adequacy of computer software influenced adoption of ICT in teacher training colleges to a large extent. Software in use should go beyond the basic computer packages and include more specialized computer packages for delivering subject specific content. The study also found that training of personnel on ICT influenced adoption of ICT. A total of 34 (24.29%) teacher trainers reported that the ICT training influenced adoption of ICT in the colleges to a very large extent whereas 39 (27.86%) teacher trainers reported that ICT training influenced adoption of ICT in teacher training colleges to a large extent. The administrators reported that training on ICT addresses technophobia which causes teacher trainers to fail to take up tasks that require integration of ICT. The study also found that age and gender influenced integration of ICT in the process of teaching and learning. By gender 11.11% of female and 39% of male teacher trainers reported to have adopted use of ICT respectively. By age, 69.56% of age group 31-40 and 3.13% of age group of over 50 reported to have adopted use of ICT respectively. The study also found that maintenance of ICT infrastructure influenced adoption of ICT infrastructure in the colleges. A total of 11 (7.56%) teacher trainers reported that that availability of computer maintenance influenced adoption of ICT in the colleges to a very large extent whereas 41 (29.29%) teacher trainers reported that availability of computer maintenance influenced adoption of ICT in teacher training colleges to a large extent. The study also found that teacher workload was another factor that influenced adoption of ICT infrastructure. A total of 31 (22.14%) teacher trainers reported that teacher workload influenced adoption of ICT in the colleges to a very large extent, 33 (23.57%) teacher trainers reported that teacher workload influenced adoption of ICT in teacher training colleges to a large extent. The administrators confirmed that high teacher workload occasioned by high class sizes affected adoption of ICT in the teaching and learning process. Moreover the study also found that presence of ICT policy affected adoption of ICT in teaching and learning process. A total of 58 (41.43%) teacher trainers reported that presence of ICT policy influenced adoption of ICT in the colleges to a very large extent, whereas 49 (35%) teacher trainers said that presence of ICT policy influenced adoption of ICT in

<http://www.cisjournal.org>

teacher training colleges to a large extent. The study found that adequacy of funds was a factor that influenced integration of ICT in the process of teaching and learning.

A total of 54 (38.57%) teacher trainers reported that they adequacy of funds affected adoption of ICT in the colleges to a very large extent whereas 35(25%) of teacher trainers said that adequacy of funds influenced adoption of ICT in teacher training colleges. It was reported by 7(71%) administrators that funds made it possible for the colleges to acquire ICT infrastructure, setup ICT network for the computers, provide software, maintain the ICT infrastructure and provide training for the personnel on how to use ICT.

7. CONCLUSION

Based on the findings of the study, the following conclusions were made:

- i) A large number of teacher trainers did not have access to computers to aid the teaching/learning process and this consequently imply that teacher trainers did not have access to the internet, which means that integration is influenced to a large extent by inaccessibility of requisite ICT infrastructure.
- i) That the teacher trainers in their colleges were either average or below average when it came to handling computers, hence had little exposure with computers and computer related technologies.
- ii) Given that curriculum delivery was mostly done in classrooms, one would be justified to say that computer related technologies were to a large extent not aiding curriculum delivery in the teacher training colleges and therefore trainees also lacked that exposure on integration.
- iii) There were a myriad of challenges which influence integration of these technologies such as; inadequate computers in the college, lack of expertise necessary for the integration of ICT in the teaching and learning process, high work load for the teacher trainers and lack of interest among teacher trainers which prevented them from integrating ICT in teaching and learning process. Thus, posing a challenge in the integration process.
- iv) There was also lack of training opportunities for the staff on how to integrate ICT in the process of teaching and learning which influence a great deal the process of integrating ICT in the process of teaching and learning.
- v) There was lack of proper ICT policy for guiding the process of integrating ICT in the teaching and learning process. Without guiding policy means that integration of ICT in teacher training colleges is better said than done.
- vi) The adequacy of funds was a factor that influenced integration of ICT in the process of teaching and learning. This impacted on the provision of hardware and software, maintenance

of the ICT infrastructure which ensures that computers work properly and provision of training for the personnel on how to use ICT, thus addressing technophobia which causes teacher trainers to fail to take up tasks that require integration of ICT.

- vii) Adequacy of computer hardware and software influenced adoption of ICT in the process of teaching and learning. The use of software should go beyond the use of basic computer packages such as word to the adoption of more specialized computer packages for delivering subject specific content.
- viii) Gender and age influenced adoption of ICT in the process of teaching and learning. This factor would be mitigated by policy and frequent training of the teacher training on the use of ICT in the process of teaching and learning.

This research will give readers a better understanding of the importance of functional, communicative and aesthetically, factors which influence integration of ICT

8. RECOMMENDATIONS

Based on the findings, the study recommends that;

- i) Primary teacher training colleges should develop strategies to identify strengths and weakness of various technological resources with a view to adopting ICT in the process of teaching and learning.
- ii) Primary teacher training colleges should develop an evaluation frame work to help in determining level of adoption of ICT in the process of teaching and learning
- iii) Primary teacher training colleges should source for partners, well-wishers, stakeholders and sponsors to finance the acquisition of more ICT infrastructure. This will ensure that the adequacy of computer in the colleges so as to improve their use in the process of teaching and learning.
- iv) Primary teacher training colleges should lessen the workload of teacher so as to enable them find time to learn and integrate ICT in the process of teaching and learning. Adoption of ICT in the process of teaching and learning would also go a long way in ensuring that the workload of teachers is lessened.
- v) Primary teacher training colleges should provide teachers with regular trainings and seminars on how to adopt ICT in the teaching and learning process. The primary teacher training colleges should ensure that they provide refresher training on regular basis.
- vi) Primary teacher training colleges should adopt policies that guide structured integration of ICT in the process of teaching and learning. One of the policy that can be adopted is adoption of appraisal practices that reward teachers who

<http://www.cisjournal.org>

Endeavour to use ICT in the teaching and learning process in addition to outlining ICT competency standards for the teacher trainers.

REFERENCES

- [1] Becker, H. (2000). Findings from the Teaching Leaving and Computing Survey: Is Larry Cuban Right? *Education Policy Archives*, 8(51) 567-589.
- [2] Ertner, P. (1999). Addressing first and second order barrier to change. *Startegoes for Technology Inegration. Educational Technology Research and Development*, (53), 56-78.
- [3] Farrell, G. (2007). *Survey of ICT and Education in Africa:Kenya Country Report*. Washington DC: World Bank.
- [4] Iarossi, G. (2006). *The Power of Survey Design: A user guide for Managing Surveys, Interpreting Results and Influencing Respondents*. New York: World Bank.
- [5] Israel, G. (1992). *Sampling the Evidence of Extention*. Florida: University of Florida.
- [6] Khoeler, M., & Mishra, P. (2005). What Happens When Teachers Design Educational Technology? The Development of Technological Content Knowledge. *J. Educational Computing Research*, 32(2) 131-152.
- [7] Kothari, C. (2004). *Research Methodology: Methods & Techniques*. New Delhi: New Age Interntional (P) Ltd.
- [8] Mugenda, O., & Mugenda, A. (2002). *ResearchMethods:Quantitative and Qualitative Approacaes*. Nairobi: ACTS press.
- [9] Murithi, P. (2005). A Frame work for Intergrating ICT in the Teaching and Learning process in Secondary Schools:. *School of computing and informatics, University of Nairobi*, 15(2), 4-14.
- [10] Nkpa, M. (1997). *Educational Research for Modern Schools; fourth edition*. Enugu: Fourth Dimension publishing company.
- [11] Omwenga, N. (2001). Use of Media resources during teaching practice(A study of Kamagambo and St. Pauls Teachers College). *Kenyatta University*, 37(6) 92-107.
- [12] Oredo, J. O. (2008). A Framework for Evaluating ICT Uses in Teacher Education: A Case Study of Primary Teacher tarining Coleges in Kenya. *Strathmore University. Nairobi*, 25(4)103-119.
- [13] Sankind, N. (2006). *Exploratory Research: 6th Edition*. Upper Saddle River: N.J Person Education.
- [14] Selwyn, N. (2007). The use of computer technology in unversity teaching and learning: a critical perspective. *Journal of Computer Assisted learning*, 23(2) 83-94.
- [15] Stekette, C. (2006). Modelling ICT integration in Teacher Education Courses Using Distributed Cognition as a Framework. *Australian Journal of Educational Technology*, 22(1) 126-144.
- [16] UNESCO. (2002). *Information and communication technologies in teacher education: a planning guide*. Paris: UNESCO.
- [17] UNESCO. (2005). *Towards the knowedge. UNESCO World Report*. Paris: UNESCO.
- [18] Van Braak, J. t., & Valckle, M. (2004). Explaining Different Types of Computer use among Primary School Teachers. *European Journal of Psychology of Education*, 19(4) 407-422.
- [19] Weisma, W., & Jurs, S. (2005). *Research Methods in Education. An Introduction*. 8th Edition. New York: Pesrson.
- [20] Wellington, J. (2000). *Educational Research: Contemporary issues and Practical Approaches*. London: Continuum.

AUTHOR PROFILE

Obegi Felix received his degree in Library and Information Science from Egerton University, in 2008 and an MBA (MIS) in 2011. He is a PhD Student in Information Systems at Jaramogi Oginga Odinga University of Science & Technology. He also has a Graduate Diploma in Information Systems and he is a Certified CISCO Professional and Trainer. Obegi has a wide experience in IS and ICT after working in the industry. Currently, he lectures at Egerton University, Department of Management Science.

Vitalis Gode received his diploma in technical education in 1986, a degree in Science Education from Kenyatta University in 1994 and Masters in Information Systems from Kisii University in 2013. Gode has a wide experiencing in education technologies. Currently, he lectures at Kilimambogo Teachers College and is the Head of ICT department.

Dr. Alice Macharia-Njuguna works at Kenya College of Accountancy University. She is an Associate Deputy Vice Chancellor, Resource Management, ICT and Distance Learning at Kenya College of Accountancy University.