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From the Classroom into Virtual Learning Environments: Essential Knowledge, Competences, Skills and Pedagogical Strategies for the 21st Century Teacher Education in Kenya

Catherine Adhiambo Amimo

Abstract

As teachers in Kenya begin to migrate from the classroom to virtual learning spaces following COVID 19 pandemic, there is pressing need to realign Teacher Education to requisite Knowledge, competences, skills, and attitudes that will support online teaching. This chapter explores these needs using a combination of lived experiences and literature review that captured a meta-analysis of research trends on e-learning. While trends in Teacher Education indicate progression towards adoption of technology, there are disparities between the theory and practice. Evidence from recent research and reports; and the recollected experiences confirmed knowledge, competence, skills and pedagogical gaps in the implementation of online learning, that have been exacerbated by COVID-19. The researcher recommends that teacher education should sensitize and train teacher trainees on how to access, analyze and use new knowledge emerging with technology; they also should be coached on how learners learn with technology and on fundamentals of the communication process. Particularly the course on educational technology, should focus on how to create and manage online courses. The 5-stage E-Moderator Model and Universal Design for Learning (UDL) are recommended as effective pedagogical scaffold for online teaching.

Keywords: online learning, digital resources, teacher education, virtual learning spaces, pedagogy, e-learning, 5-stage E-moderator model, universal design for learning

1. Introduction

Anyone who enjoys swimming knows that they began learning from the shallow end as they progressed into the deep end of the swimming pool, by then feeling confident and able to swim back and forth navigating and experiencing the motions of the waves that vary across the pool. It is unnatural and very dangerous to learn

swimming in the reverse order. The latter depicts the experience of many teachers in Kenya, as a result of the COVID 19 pandemic which led to abrupt closure of schools. From the "brick and mortar" classrooms, that have been sacred comfort zones, the teachers suddenly found themselves thrown into virtual learning environments, which neither their initial training nor in-service programs had prepared them for. This was not unique to Kenya, as there were about 1.5 billion students and 63 million teachers who engaged in online teaching and learning during the COVID-19 lock down [1].

In Kenya the ministry of education encouraged schools, colleges and universities to combine use of radio and television with on online teaching as the country adhered to international and national guidelines on social distancing [2]. The International Council for Open and Distance Education also offered website, webinars and resources for teachers, but all these have not been adequate; as evidenced in issues related to course designs, content support, course assessment, learner and teacher characteristics [3, 4]. Indeed, recent research on online learning indicate gaps in accessibility of e-resources, use of online tools, management of platforms, instructional methods, and teacher development programs [1]. Teacher education programs at the university are challenged to support teacher educator' s efforts in strengthening the ICT capacities of teacher trainees, as they prepare for more technologically oriented classrooms. In this chapter the researcher explores the kind of knowledge, competences, skills and pedagogical strategies that teachers need, to teach effectively with technology.

2. Types of knowledge necessary for the 21st century teacher education

Before the outbreak of COVID 19, the Twenty First Century already presented the world with complex advancements that are marked by new scientific discoveries, globalization, information explosion, development of astronautics, digital technology and artificial intelligence- to mention a few. It was already evident that the nature of knowledge as we knew it was going to change. In fact, there is now pressing need to update content in major academic disciplines; taking into consideration the need to focus on knowledge that is most worth. To this end the question that needs to be addressed is "What type of knowledge is of worth for teachers as they move from the classroom to the virtual learning environments? especially as the pandemic continue with restrictions on face-to-face learning. Past research that focused on teacher education for the 21st century, underscored that teachers need a strong knowledge base for effective practice and also to boost their academic efficacy [3, 5].

Historically, teaching started as one dimensional art – a case in which the basic knowledge that the teacher needed was that of the subject matter. With time the method of presenting become critical. and it became necessary for the teacher to have knowledge on how to organize and present content meaningfully. During this phase the main focus of training was on pedagogy. In the next phase, it become essential for a teacher to have knowledge of the learner, therefore educational psychology was stressed in teacher education programs. Then entered phase four that stressed that students learn better when resources are used and through interaction with mass media and people. Phase five, which is the latest development, now defines the teacher's role as a facilitator of learning rather than a provider of information. With technology, information is now on the web and learners only need to be facilitated to tap into it.

Unfortunately, teacher education programs in Kenya still operate in phase one and two, with even more emphasis on knowledge transmission. Referring to the

allegory at the introduction, phase one of teacher education simulates the shallow end of the swimming pool. The level from which teachers were hurled into the deep end of learning with technological resources, depicted in phase four and five. This can be illustrated using the records of teaching online from one of the universities in Kenya (with permission). E- learning was introduced to the university in the year 2015. Up to 2018, through trainings and persuasions and resistance, only 150 courses had been launched on the university online platform. Between March and November 2020-when the pandemic struck, a total of 1470 courses had been mounted (with a panic that was evident in the sudden change in operations. The main concerns have been on how to deliver content to virtual learners. This section covers what teacher education should prioritize in terms of knowledge of the learner, the subject matter and the communication processes that contribute to effective online teaching.

2.1 Knowledge of the learner

Teacher education programs now need to give priority to the knowledge of learners and how they will learn and develop within the context of the "New Normal". For a long time, educators have relied on behavioral and cognitive theories to understand how learners learn; and this has made them believe that learners only react to and process knowledge that is presented to them. Literature on teacher education is littered with persuasion for teachers to adopt constructivist views that learners actually construct new knowledge based on their experiences. Beyond constructivism, recent research on educational technology advance transactional theory, as the model for online teaching. This theory presents teaching as a transactional business; and introduces a customer care language that teachers should adopt. Both learners and teachers form a community of inquirers, collaborating and making meaning of the learning content. In this context, it is critical to know how learner characteristics, circumstances and needs impact on the way they learn. One of the critical needs is for the learner to fit in the technologically wired world, and there is now a wider advocacy for Universal Design for Learning (UDL)- a model that stresses the use of multiple means of representation, action and expression, and engagement to cater for the needs of diverse learners [1, 6, 7].

2.2 Knowledge on content and resources

While a majority of teachers tend to rely on old notes (yellow notes) which were probably passed on from their own teachers or those they made in the yester years, technology has ushered in an age of information explosion. This requires the teacher to have a thorough understanding of how content in his/her subject matter is developing, in terms of goals and disciplinary demands. A famous educator Heidi Hayes in his book 21st Century Curriculum, emphasizes that a time has come when we need to update the content that is taught in educational programs or else we risk teaching obsolete knowledge. This is because we live in an age of knowledge explosion, a time that requires us to continuously upgrade knowledge- choosing on what knowledge to add or subtract in any given discipline. Teachers, particularly, need to have knowledge on changes in general [8].

As it is, the nature of teaching requires, the teacher not only to be grounded in his subject, but to be able to relate the content of that subject with the socio-economic, political and technological realities. All these come in as new knowledge that forms the core of interdisciplinary themes that need to be in cooperated in the teacher education program. These themes include knowledge that does not necessarily belong to a particular discipline. Examples are, climate change, family life

education, entrepreneurship and health education [9]. The 21st century require teachers to be able to utilize such interdisciplinary knowledge to help students solve complex problems of the world such as climate change and unemployment. Though recent reforms in teacher education in Kenya introduced courses such as Educational Guidance and Counselling, Entrepreneurship, and Environmental Education to capture this need, a lot more should be done to help teacher educators access online resources that can aid in the teaching of these and other content as they pass on the requisite knowledge to teacher trainees.

The WWW search engines provide a plethora of information regarding all subject matter. E-resources such as electronic books, electronic journals, dictionaries, newspapers, magazines, references, directories, and audio-visual materials are available for use [10]. Teachers should have knowledge on the different types of e-resources and how to access them. Both teacher educators and teacher trainees should be guided not just on how to access URLs that connect users to licensed digital resources, but in the understanding of the relationship between the URL and the technological infrastructure. This has become a challenge as libraries are also in a dilemma on whether to create accessibility of digital resources through library catalogues or separate databases [11]. In Kenya, the United Nations, Kenya Institute of Curriculum Development -at the Kenya Education Cloud (kec.ac.ke), together with the Kenya Broadcast Cooperation have attempted to provide resources for online teaching, particularly for basic education [12]. The teacher trainees going to teach in high school would benefit from such resources.

2.3 Knowledge on communication process

Communication is defined as a two-way process of interaction which allows people to convey information and reach, a mutual understanding. Online teaching requires effective communication, which can only be achieved if the teacher understands the communication process. This includes knowledge on how communication is transacted between human beings, and applying the same in understanding how different computer programs work. Brooks in his book "Web-Teaching: A Guide to Designing Interactive Teaching for the World Wide Web" points out that learning computer programs can be challenging- it is "almost like learning a programming language in terms of how it works and what it does". There are special programs for specific disciplines. For instance, in chemistry there is a special program for creating images of molecular structures [13].

Coming back to human communication, it is important for the teacher to master the basic process of communication which includes encoding of the message by the sender, the communication channel, noise factors, and the process of encoding of the message and feedback by the receiver. In the context of online teaching, the teacher acts a sender of information, which he passes on to the learners using appropriate channel or media; the students receive and decode -interpret the information and gives feedback to the teacher. It is the responsibility of the teacher to eliminate noise factors which presents themselves as actual noise or related factors, that can potentially act as barriers to the communication process.

3. Competencies for online teaching

Competence can be defined as an excellent capability in undertaking a given task. In this discussion, competence comprises of knowledge, skills, attitudes and experiences that will enable teachers to teach for optimum learning to take place. While Competency Based Curriculum (CBC) is trending – Kenya having adopted

CBC in 2018, a lot of teacher education programs still emphasize Content Based Curriculum; that stresses knowing and not doing. Particularly, in the era of online learning the focus should be on what the learner should be able to do with technology as he learns and operate in the "New Normal". As far as this is concerned the teacher is expected to be an effective model of competence. Ironically, students engage more in learning using open and free sources and web-based devices more than their teachers. Research further indicates that even when teachers are willing to engage with these devices, the professional development on new learning designs and delivery is slow and teachers are not as innovative. On this note, there is call to produce teachers with teaching innovations and professionally viable competencies. In online teaching, the teacher should be competent in creating, organizing and managing a course [6, 14]. The following sections analyze competencies related to these requirements.

3.1 Creating, organizing and managing an online course

In order to create and manage an online course effectively, the teacher should be familiar with Learning Management System (LMS). In Kenya only a few teachers can create, organize and manage an online course using a given type of an LMS [4]. For clarification. LMS refer to web based or cloud based software programs which help teachers to organize and manage online courses. They come in three categories as follows; (1) open source-examples are Moodle and SAKAY (2) Cloud based -such as Digital Chalk, Docebo SaaS LMS, TalentLMS, Firmwater LMS, and Litmos LMS, and (3) Proprietary Learning Management System-these are licensed by their developers under the legal rights belonging to the copyright owner (s), examples are Design2Leran, and ANGEL (property of Blackboard Inc.). Among these, Moodle is commonly used in Kenyan Universities, but many lecturers have not explored its multimedia tools which would support in the generation of content, assignments, and quizzes; as well as the features of interaction such as discussion groups and chat sessions [15].

The actual creation of a course will further require competencies in accessing and using digital media skillfully; analyzing and evaluating content in terms of its "quality, veracity, credibility, while considering potential effects and consequences of messages". Additionally, the teacher also needs to be able to create his/her own content and reflect on ethical consequences [7, p. 25-Dalton citing Hobbs].

3.2 Creating effective social climate in online classrooms

It is critical to create conducive social climates for the virtual classrooms. Education serves a social function, and borrowing from the theory of distributed Cognition and constructivism; knowledge is distributed among people and through sharing individuals construct new knowledge. This can only happen in mutually supported environments. On this note, it is important to create a conducive environment right from the beginning of an online course. This requires setting rules and etiquettes for the course and having students sign up to comply. The students should also have a slot for self-introduction and expressions of expectations. The following excerpt is shared from an online course EDTE 301 Educational Communication and Technology for illustration.

Student "A"- Saturday, 12 September 2020, 7:10 PM

My name is Masitsa Lydia, I am accessing this course from Uasin GIshu county. I am so privileged to be part of this group and I strongly believe that my desire to understand the essence of technology to education in our country today will be fulfilled here.

Student "B" - Monday, 7 September 2020, 3:48 PM

am Emmanuel Wambua a fourth year student doing bachelor degree in education from Machakos. I expect that at the end of the course I will be able to apply technology as part of communication in my teaching career.

The foregoing postings are expressions of who the students are and their expectations. They set pace for further interactions. Subsequently, as the teacher develops course materials, each topic should have a discussion forum or chats- which not only helps the teacher to assess learning progress, but also to assess the evolving attitudes of learners towards each other and the course. The class can also be divided into smaller discussion groups to boost bonding. Another social media which is useful in enhancing cohesion, and is commonly used by students in Kenya, is WhatsApp. Most learning platforms are also connected to emails through which the teacher can send private messages to students on respective assignments or issues. A research that explored MOOC as a form of professional development found that the participants liked the use of face book page and emails in supporting learning, but were not conversant with twitter; yet twitter chats are becoming an effective way of professional development-helping teachers to share their research, ideas and building positive digital foot prints. Blogs too, can be used for posting assignments, projects and networking [16–18].

The next set of competencies that are equally important have to do with professional ethics. These comprise patterns of professional behaviors, self- reflection and moral integrity. Online learning is very complex and dynamic, involving multiple players and sources of information. It calls for a high level of responsibility- according respect and maintaining confidentiality with regard to students' information. The increased use of facilities such as e-mails and other virtual communication can lead to comprises. It is however important to attach and express value and respect to all online course stake holders, particularly when using presentation tools such as Google meet, Big Blue Button, and Zoom that allow for live video conferences. During such interactions, the teacher should act professionally and also require students to exemplify the right decorum [18]. The researcher puts significance on this point because research seems to indicate that teachers and student teachers are less likely to undertake activities that involve interaction with others, and that it is hardest to teach competencies that have to do with soft skills to teachers [5].

3.3 Adherence to copy right rules

In the process of creating an online course, there is need to observe integrity with regard to copy right rules. This involves acknowledging of all sources of information that are used in the course, and where necessary asking for permission to use material as indicated by the source. In order to do this, the instructor needs to be conversant with different types of information sources, with regard to their use. We have plenty of open sources of information, while other sources have varying restrictions on use. Learners should also be educated on copy right regulations and held accountable for any violations. While there have been attempts by specialist in copyright regulations such as The National Unit of Copyright Unit of Australia to support teachers in Australia [3] those in Kenya are disadvantaged. Essentially, online learning will only be credible to the extent that the instructor will also observe ethical diligence in the quality of content, learning and assessments offered. For assessment, this does not only require competence in varying test items, but using monitoring tools during examination to ensure examination integrity.

4. Types of skills necessary for online teaching

The nature of digital resources requires that teachers must constantly acquire and implement new skills as technology advances. This is the reason why scholars who have taken interest in online learning recommend professional development as one of the pillars of sustainability of e-learning. Recent studies have revealed that even though computer literacy would improve the uptake of e-Learning in Kenyan universities both lecturers and students have limited Information and Communication Technology (ICT) skills. The scenario worsens in cases where there are differences in digital literacies between teachers and students [1, 15, 16]. In this section the researcher brings into perspective computer skills that are useful in conducting online teaching, that should be emphasized in teacher education programs.

4.1 Word processing

Some of the important features of Microsoft word that are useful in creating content for teaching include; desktop publishing, formatting, grammar check, spell checking, tables, web format; electronic spread sheet features such as spread sheets and work books, auto formatting, charting, what-if-analysis, archiving, and academic software such as games, simulations, drill and practice, and integrated learning systems. Mastering these features and their functions is essential because band width and security issues normally limit the use of WWW in many ways and a teacher may have to create his/her own instructional materials using options such as CD-ROMs; which students can access asynchronously.

Other additional skills include how to create and use the following types of multimedia; images, drawings/paintings, animations, graphs, sounds, 3D, and virtual reality. For example, how to image tag using GIF wizard, getting pictures using scanners, photo CDs, digital still cameras and using them to create simple animations; and recording voice on power points. Since students learn in multiple ways and learning is also enriched through multiple sensory input, the teacher should be skilled in presenting content and facilitating learning using a variety of multimedia. Notably, in the digital world there is also need to constantly rework and rewrite documents [19], this makes it necessary for the teacher to be skilled in using different features of Microsoft word.

4.2 Skills in management of online platforms

The teacher should be familiar with the features of different Learning Management Systems and the functions of each of the integrated tools; so that one can successfully create content for a given course and manage it throughout the semester. Most universities avail a web site for online teaching, but the management of the individual courses depend on the skills of the individual faculty. For example, in using Moodle platform, there are important features such as "edit" and "add activity". The activity can be a label, assignment, quiz, discussion forum, file, and so on. Once you click an activity like a quiz you need to be skilled in setting up the quiz, editing- meaning adding or and editing at times deleting or revising questions. While doing this, related features have to be controlled for example striking the editing button and selecting hide the quiz from students; otherwise those who are online will see the quiz/test prematurely (this has happened to some teachers). It is also important to go into review options and block students from reviewing the quiz when it is still open, because they may share answers with those still doing the quiz.

In order to promote learning the teacher should be skilled in managing meeting platforms such as Zoom, Big Blue Button; knowing how to set it up, and managing the presentation and participants by manipulating buttons such as share screen, chat, audio, and webcam. Some teachers confess that when they first use the Big Blue Button, they are not able to control the class because they do not know how to mute a few students who log in with a lot of background noises. They are not even able to use the video or share the screen. For many teachers, performing these actions is an uphill task because the initial teacher training was devoid of these requisite skills. A recent research in a Kenyan university revealed that only 25% of the faculty had been trained in management of online course, and only 20% had attended related seminars or workshops; yet students reported that course information (58%), layout (48%), announcements (38%), and reminders (35%) contributes to the effectiveness of an online learning [4]. For this reason, there should be a deliberate move to in service Teacher Educators in management of online courses so that they pass on the skill to teacher trainees as part of their training. This can be strengthened further, through virtual supervision of teaching practice- a model that some teacher training universities are already using to circumvent the restrictions of COVID 19 on face to face interactions.

5. Pedagogical strategies for online learning

A synthesis of research that spanned the period 2009–2018 revealed that the focus of research on e-learning is shifting from devices and apps towards the pedagogical process, with more emphasis on pedagogical innovation. In particular, pedagogical designs that can be adopted at university level [1, 20]. In Kenya, apart from teacher educators, most lecturers have been teaching without any pedagogical training, until the onset of online learning that necessitated sporadic trainings on how to deliver content to learners. Now there is greater need for deliberate training in a variety of strategies when integrating technology and media into a lesson. Instead of using only didactic approaches- that fitted face-to-face classroom interactions, the following dynamic approaches can be adopted (1) Presenting (2) Conducting (3) Facilitating and (4) Mentoring. The psycho-pedagogical basis of these approaches is found in the theories of social constructivism, connectivism and collaborative learning [7].

5.1 Presentation

Presenting is a teacher centered strategy that focuses on divergent thinking and embraces methods such as lecture and demonstration. In presentation the instructor disseminates information to learners, and the source of the information can be a text book, an audio tape or even a video. Students can also be made to view real or life like example of a skill or a procedure. This strategy can be used during synchronous meetings in such platforms as Zoom, google meet and Big Blue Button, but instead of having the teacher present all the time, students can be given a chance for group presentations. Some teachers who have experimented with this report that it is an interesting way to engage learners.

5.2 Conducting

This strategy is analogous to activities of a choir master, who does not sing, but guides the singers by helping them to read the notes and conducting the practice. The online tools which can be employed in this strategy are drill-and-practice; and

tutorials and gaming. In drill-and- practice learners are led through a number of exercises that enhance knowledge on specific content or a new skill, while in tutorials the teacher or a computer software poses a question to which the learner provides an answer and receives appropriate feedback. Gaming provides challenge in learning and is a great motivator, particularly for online learning.

5.3 Facilitation

Facilitation as a strategy is learner centered, process oriented, flexible and allows for divergent thinking. It is supported by transactional theory, that was discussed earlier in this chapter. It uses methods such as discussion; and question and answer. Teachers should act as facilitators of collaboration, in learning activities such as creating of digital resources, presentations and projects. Facilitation is also, most, applicable in web discussion forums where students give their views and the teacher acts as a moderator [18]. Alternatively, it can be used in chat forums where students post their ideas and views. Here is an illustration that captures a discussion forum in one online course EDTE 391 Educational Communication and Technology.

Wednesday, 2 September 2020, 11:49 AM

Number of replies: 6

The Discussion Question: Is it all that important for prospective teachers to train in the use of technology in education?

Student "A" - Thursday, 3 September 2020, 9:36 AM

This is a very important subject in teacher training considering the fact that we live in a dynamic fast-changing world. A recent example is the effect of the COVID-19 pandemic on education. Many schools are going online and who knows, that may be the new normal in various aspects in education. This implies that prospective teachers need to be equipped with knowledge in educational technology.

Student "B" - Monday, 28 September 2020, 9:45 AM

In my opinion, all prospective teachers should have a training on how to use technology in education. Technology has revolutionized how learning and teaching takes place by use of more improved media like computers and projectors. The use of software like word and power point has also increased in the recent past which necessitates the need for each prospective teacher to be able to use them among other many forms of technology like printing media and also e-learning services. This is just but an example of how much there is need for technological knowledge in teacher training.

5.4 Mentoring

Previous qualitative and quantitative research has shown that many online learning activities exist, but are less frequently performed by university students, particularly teacher trainees. These include playing educational games, using virtual environments for learning, participating in online courses, using ICT for self-assessment, and planning the learning process [1, 18, 21]. This raises the need to mentor student teachers into these activities. Mentoring is inquiry- discovery approach that promotes initiative, creative and imaginative thinking. In this strategy the teacher and the learner set forth a problem to solve and both participate in the learning process, though not on equal terms. The teacher acts as a co-investigator or a co-learner. Mentoring provides the tools and hands –on experience with which the teacher trainees need to begin their career. In Taiwan mentoring role is stressed particularly to prepare student teachers with high learning models, observation and reflection. Indeed, teacher educators should be mentors and coaches for teacher trainees, showing them how to use social media, and create resources [5, 18].

In this approach the teacher learns a lot of technological skills from the learners who already have an upper hand in this. Proponents of online learning agree that being an online learner contributes to an academician's professional development of becoming a technology-enabled designer or teacher, [17]. One teaching method that can be used in this strategy is the project method; which fits with many features of online learning. The researcher recollects an experience with the project method in teaching the course Educational Communication and Technology. In this case, the students were to identify a problem, use a topic of interest and select four types of media to solve the problem. One group focused on solving the modern problem of race by revisiting Trans-Atlantic slave trade and used power points, recorded voice, video and music for illustration. This was very interesting. The teacher offered support, only when it was necessary.

6. 5-stage model on role of E-moderator in online learning

To sum up this section on pedagogical approaches to online teaching the researcher explored the ideas of Gilly Salmon on how to design and manage online classrooms. Both her textual and video messages assert that in order for the online learning to be successful the learners have to be supported through a structured and paced program of e-tivities which offer high levels of interaction, engagement, flexibility and feedback. The role of the E-moderator is to promote interaction and communication. Processes that enable achievement of these two goals include modeling, conveying and building knowledge and skills; and mediating the online environments. This 5-stage model is developed with a focus on the learner's profile and needs; stressing the kind of support that the e-moderator (teacher) should provide to enable the learners to build expertise in learning online. The model is illustrated in **Figure 1** (used with permission).

At stage one, there has to be access to online platform and the teacher needs to welcome and encourage the learners to interact. Stage two comprises of establishment of online identity. At this stage the teacher abridges between the cultural,
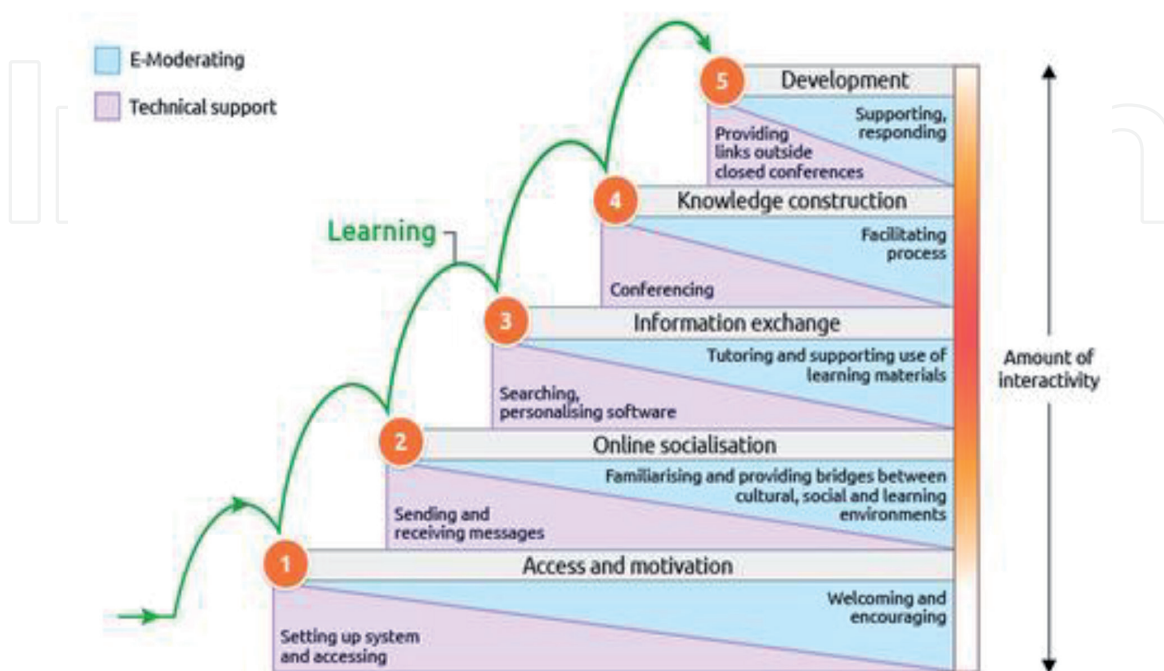

Figure 1.
[22] E-moderating: the key to teaching and learning online. 3rd edition, page 32.

social and learning environments as the learners begin to bond. Some of the important activities are sending and receiving messages. Stage three is that of information exchange. The teacher is required to scaffold the tasks by supporting students in the use of e-learning materials such as videos or text materials. Stage four involves knowledge construction, and activities such as discussions; and to be successful, collaborative interactions like conferencing are useful. The last stage is of development and requires the teacher to further support and respond to students as they realize personal goals. This can be done by providing links and integrating online learning with other modes of learning. In a study exploring MOOC as a form of professional development the participants acknowledged that the 5-step model is a positive method for guiding online learners [5, 6, 17]. This model can provide great insight, as teacher education programs in Kenya endeavor to engineer techno friendly pedagogies.

7. Conclusions and recommendations

Through exploration of literature on past research this study reveals that the teaching and learning ecosystems are changing to adapt to the realities of global changes that seem to affect all spheres of life. Thus, necessitating the need for new knowledge, skills and attitudes that will help the learners to adapt to the rapidly changing world of the 21st Century. Amidst these changes, it is significant to acknowledge the role of technology both as a trigger and vehicle by which learners and teachers can navigate through the crisis presented by the changes. Technology has brought in new knowledge into disciplines, some of which have not even been classified-yet are counted as very important in addressing problems such as global warming. The traditionally certified teacher's Knowledge, competencies, skills and pedagogies will no longer suffice in the present teaching and learning ecosystems. Lead researchers in teacher education have acknowledged the critical need for revamping teacher education, particularly, to in cooperate technology and optimize the use of digital resources and information management systems. In this case the teacher acquires a new tittle as E-Moderator; and this demands knowledge of ICT, learners and re-adjustment of pedagogical strategies. The researcher recommends that teacher education programs should strengthen the foundational, and professional courses to reflect the changing realities. There should be mentoring on online teaching across levels of teacher education programs in Kenya, and also benchmarking with successful teacher education programs outside the country. This is what Linda Darling-Hammond and John Bransford refer to as "learning about practice in practice" or "learning in and from practice" [9].

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Notes

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