



Experiences and Constraints of Teacher Trainees on Integration of 21st Century Skills in the Instructional Process during Teaching Practicum in Kenya

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Abstract

Twenty first Century skills are significant in preparing learners for the rapidly changing society locally and globally. This paper is a report of a study that was carried out in 2023 on experiences and constraints of teacher trainees on integration of 21st century skills in the instructional process during teaching practicum in Kenya. The study adopted a Mixed Methods approach and a descriptive research design. The study was guided by Vygotsky's social cultural theory. A sample of one hundred and fourteen Bachelor of Education students from two public universities in Kenya were selected through stratified and convenience sampling methods to participate in the study. Data was collected in May and June, 2023 using students' questionnaires that comprised of both closed-ended and open-ended questions. Data was analysed through descriptive statistics and thematic analysis. The study found out that teacher trainees were very competent in the integration of written communication skills, 66 (57.9%), and collaboration skills, 70 (61.4%) during the teaching practicum. Teacher trainees rarely integrated creativity, critical thinking, information and technology literacy skills, adaptability and citizenship skills in the teaching and learning process during the practicum. The major constraints encountered by teacher trainees were limited knowledge from undergraduate training and limitations of materials and resources in the schools. The study recommended that teacher education curricula should strengthen the integration of 21st Century skills in the instructional process, use of learner centred instructional strategies and schools to acquire relevant materials and resources on the integration of 21st Century skills in the instructional process. The results of this study inform curriculum development process for Competency Based Teacher Education. University instructors and teachers can draw from the findings for quality teacher training and instructional processes.

Key Words: *Teaching practicum, 21st Century skills, Teacher education, Integration, Teacher trainees*

1.0 Introduction

Twenty first (21st) Century skills are significant in preparing learners for a rapidly changing society locally and globally. Currently, there is great emphasis on 21st Century skills in education giving impetus to research on policy and practice. According to the Great Schools Partnership (2020), 21st Century skills are a set of knowledge, skills, work habits, and character traits that are believed by educators, school reformers, college professors, employers, and others to be critically important to success in

today's world. The 21st century skills are grouped into four main domains: *ways of thinking* (creativity, critical thinking, innovation, problem solving, decision making, learning to learn); *ways of working* (communication, collaboration); *tools for working* (digital literacy - information literacy, technology literacy); *Life skills* (citizenship, networking, adaptability, leadership networking, global awareness) (Chu et al, 2017; Great Schools Partnership 2020, The Partnership for 21st Century Skills, 2009). The 21st century skills concept is motivated by the belief that teaching students the most relevant, useful, in-demand, and universally applicable skills should be prioritized in today's schools (Great Schools Partnership, 2020).

Many countries are putting an emphasis on 21st Century skills in their education system to adequately prepare learners for life. In Kenya the curriculum for basic education has currently been revised to adopt Competency Based Curriculum (CBC). The vision of basic education curriculum in Kenya is 'nurturing every learner's potential' and the mission is 'engaged, empowered and ethical citizen' (KICD, 2019). This mission and vision are achieved by providing the learners with the learning experiences that they require in order to thrive in the 21st century. The CBC in Kenya stresses on the integration of 21st Century skills through seven identified competences: communication and collaboration, self-efficacy, critical thinking and problem solving, creativity and imagination, citizenship, digital literacy learning to learn (KICD, 2019).

Teaching practicum is an important field work component in teacher education usually carried out in a school setting. The purpose of teaching practicum is to facilitate the application of instructional knowledge, skills, attitudes and values in a school setting. During the teaching practicum, teacher trainees practice teaching under the guidance of cooperating teachers and university instructors. Currently, most Bachelor of Education degree programmes in Kenya take four (4) years. The students pursuing the Bachelor of Education degree programmes usually undertake the teaching practicum after their third year of study. According to Ben De Souza (2017), during the teaching practicum, teacher trainees are expected to showcase the knowledge and skills gained from theoretical courses at the university. Teacher trainees carry out various tasks during the teaching practicum that include selection and use of instructional methods; techniques and resources for teaching and learning; preparation for instructional documents; actual lesson delivery and assessment.

Integration is as an approach in education that entails selection and use of learning experiences that enable learners to draw meaningful connections and relationships across their learning and life experiences (Syomwene, Nyandusi & Yungungu, 2017). Integration enhances deep learning and application of knowledge and skills to real life. It also enables learners perceive knowledge in unity. With the emphasis on integration of 21st Century skills in Kenya, it is expected that teacher trainees take up this requirement in executing the various tasks for quality education in the country. Mahmud and

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Wong (2022) propose the need for educational institutions to prioritize on effective teaching of 21st Century skills.

1.1 Problem statement for the study

21st Century skills prepare learners adequately for life in the 21st century. The 21st Century skills are not a completely new phenomenon but the importance currently attributed to them is relatively new and because of this, there's need to investigate their integration in the instructional process. The novelty on 21st Century skills lies in the application of skills (Fisser & Thijs, 2015) which was the drive of the study. According to Syomwene (2023) integration of 21st Century skills in education enhances quality and relevance. Kim, Raza & Seidman (2019) opine that there is increasing interest on how teaching practices and classroom processes affect student learning because curriculum delivery has a substantial impact on the way in which 21st Century skills develop in the learners. Martinez (2021) recommended researches that can develop frameworks on teacher capacity in applying the principles of 21st Century skills through an integrated approach.

Laar et al. (2020) conducted a study on determinants of 21st Century Skills and 21st Century digital skills for workers. The results showed that there is strong need for research on determinants of communication and collaboration skills. The two skills were part of the investigation in the study reported in this paper. The Partnership of 21st Century skills (2009) recommended that curriculum and instruction should focus on providing opportunities for applying 21st Century skills across content areas and for a competency-based approach to learning. Another recommendation was the need for teachers to use innovative learning methods that integrate the use of supportive technologies, inquiry and problem-based approaches, and higher order thinking skills. The study reported in this paper partly filled the gaps highlighted in the aforementioned studies. According to Great Schools Partnership (2020), there is a belief that many schools may not sufficiently prioritize 21st Century skills thus the need for a study to shed more light on the state of the affairs.

1.2 Research purpose and objectives

The research purpose was to investigate the experiences and constraints of teacher trainees on integration of 21st century skills in the instructional process during teaching practicum in Kenya.

The study was guided by two research objectives thus:

- i) To investigate teacher trainees' experiences on integration of 21st Century skills in the instructional process during teaching practicum
- ii) To find out constraints encountered by teacher trainees on integration of 21st Century skills in the instructional process during teaching practicum

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1.3 Theoretical framework

The study was anchored on Vygotsky's social cultural theory which proposes that cognitive development is a result of social interactions (Vygotsky, 1978). Vygotsky advanced two concepts in this theory: Zone of Proximal Development (ZPD) and More Knowledgeable Other (MKO). ZPD is the gap between what an individual can perform on his/her own and what he/she can perform with the guidance of an expert for optimal development. To Vygotsky, the ZPD is achieved through scaffolding: guidance, mentorship and facilitation of learning by the MKO. The MKO is a person or an expert with greater knowledge and skills than the learner. MKO can also be an environment that provides the opportunities to gain knowledge and skills. Vygotsky stresses on the role of social interactions in the development of higher mental abilities.

The study reported in this paper was an investigation of teacher trainees' experiences and constraints on integration of 21st Century skills in the instructional process in teaching practicum. The theory was related to the study as it was centered on the role of the teacher who in this case is the expert or the MKO. The integration of 21st Century skills is a scaffolding endeavor by the teachers for optimal development of required competences in the learners in preparation for life in the society. Integration of 21st Century skills in the instructional process can be achieved through various methods: interactions between the teachers and the learners, facilitation of learning through learner centered learning activities and techniques, selection and use of a variety of relevant instructional resources, appropriate classroom environments, collaborations amongst learners and teachers and integration of technology in the instructional process. Through the interactions proposed in Vygotsky's theory, learners negotiate meanings and with the teacher, peers, materials, and atmosphere embedded in the context resulting in the achievement of learning outcomes (KICD, 2019).

2.0 Literature review

This section presents literature review for the study

2.1 Twenty first Century skills and their significance

Twenty first Century skills encompass the knowledge, skills, values and attitudes that learners should master to succeed in work and life in the 21st Century. 21st Century skills are categorized in four domains: *ways of thinking* (creativity, critical thinking, innovation, problem solving, decision making, learning to learn); *ways of working* (communication, collaboration); *tools for working* (digital literacy - information literacy, technology literacy); *Life skills* (citizenship, networking, adaptability, leadership networking, global awareness) (Mahmud & Wong, 2022; Chu et al., 2017; Kennedy, Latham & Jacinto, 2015).

This study sought to explore the experiences and constraints of teacher trainees on integration of 21st Century skills in the instructional process during teaching practicum. According to Mahmud and Wong (2022), it is important to raise the exposure of undergraduate students on 21st Century skills. Currently,

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many countries have integrated the 21st century skills into their school curriculum. School programs have to support the development of necessary 21st century skills for quality education. 21st Century skills are necessary for teacher trainees, and the practicum is the perfect opportunity to put them into practice (Llego, 2022). Teachers must strive to develop the 21st Century skills in the learners in preparation for life. According to Martinez (2021), the benefits of developing 21st Century skills includes improved levels of engagement, increased relevance, and connection to the real world.

Creativity and critical thinking are primary skills in the 21st Century. KICD (2019) define creativity as the ability to perceive the world in new ways, to find hidden patterns, to make connections between seemingly unrelated phenomena, and to generate solutions. Critical thinking entails reasoning, making judgements and problem solving and is important for lifelong learning (Laar et al., 2020; KICD, 2019). According to Leest and Wolbers (2020), critical thinking skills enable individuals to analyze a problem and to identify the limitations of existing solutions in order to know what a better solution might look like. The world needs individuals that are critical thinkers, creative, problem solvers and decision makers (Olugbenga, 2021). Creativity is essential in generating new ideas to solve problems and critical thinking is essential in evaluating and improving the ideas (Leest & Wolbers, 2020).

Problems are part of life and thus the significance of problem-solving skills in 21st Century. Problem solving is a skill of identifying a problem, defining it, analyzing it and choosing and applying strategies to solve the problem (Fisser & Thijs, 2015). Kapur (2020) opines that the individuals who possess the abilities to resolve problems or to cope with problems are able to cope with life and achieve their academic goals. When the individuals develop problem solving skills, they are able to make wise and prolific decisions.

Communication is exchange of information or ability to transmit information. According to Ekeowa (2016), communication is a crucial instrument of social interactions and a medium through which all relationships are established and maintained. It also touches every aspect of life.

Collaboration is a core skill in the 21st century. Collaboration entails jointly realizing a goal with others, complementing and supporting others, working together to realize goals (Fisser & Thijs; KICD, 2019). Collaborative skills are necessary in solving complex, interdisciplinary problems as they promote the understanding of alternative perspectives, which is vital for life and education (Piniuta, 2019).

According to Martinez (2021), today's world, makes it more crucial than ever for students to be able to interact and collaborate with people from different cultures. Schools require teachers who are not only knowledgeable but also flexible, inventive, and ready to collaborate. Through collaboration, students build new understanding by challenging others' ideas and defending their own. As a result, this births innovation by creating a product that is different from what any individual could produce alone (Piniuta, 2019). Collaborative learning enables students to share experiences and contribute to each other's understanding of a topic and to complete a given task (KICD, 2019). When students collaborate in group

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assignments and projects it results in deeper information processing and more meaningful psychological connections compared to working independently (Piniuta, 2019).

Digital literacy skills are indispensable in the 21st Century as they are necessary to prepare students for work beyond the classroom (Erwin & Mohammed, 2022). Digital literacy can be described as the knowledge, skills and behavior necessary to effectively and safely use a wide range of digital content and devices (KICD, 2019). Erwin and Mohammed (2022) define digital literacy as the ability to understand, analyze, and use information in various forms through computer devices. Digital literacy skills enable students to find, use and manage information from trusted websites.

According to Laar et al. (2020), ICT has made it easier to reach a wide audience and communicate at a distance, faster and more ubiquitously. ICT has become an important medium for accessing and connecting information and thereby solving problems. UNESCO (2002) state that ICTs provide opportunities for teachers and students to collaborate with others across the country and across the globe. They also provide new tools to support this collaborative learning in the classroom and online. When students know how to use technology to create, evaluate, and share information, they can become productive members of the digital society (Erwin & Mohammed, 2022).

There are essential life skills that students require to be productive members of the society. Amongst these are citizenship skills, networking, adaptability skills and global awareness. Citizenship is a sense of belonging and attachment to one's nation (KICD, 2019). According to Janasz & Forret (2007), networking can help individuals search for and secure employment opportunities, gain access to needed information or resources on short notice and obtain guidance, sponsorship, and social support.

2.2 Integration of 21st Century skills in the instructional process

For the purpose of this paper, integration of 21st Century skills in the instructional process entails the procedures through which teachers make conscious efforts on the practice and development of 21st Century skills by infusing related concepts in the learning outcomes, content, learning activities, resources, instructional approaches and assessment methods in the teaching and learning process. Integration of 21st Century skills in the instructional process enhances deep learning and thus quality education. The classroom is the space where learners observe the modeling of 21st Century skills by the teachers (Kim, Raza & Seidman, 2019).

Integration of 21st Century skills is best done in interactive educational environments. Learning is enhanced by the daily interactions and experiences that take place in the classroom (Kim, Raza & Seidman, 2019). The school environment contributes greatly to quality curriculum implementation (Syomwene, 2018). Vygotsky's theory assumes that learners learn best in interactive social environments. Interactions permit collaboration and communication through scaffolding opportunities by the More Knowledgeable Other (MKO).

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Tan (2003) states that the learning environment should include opportunities for collaborative learning. Collaborative learning helps learners learn from one another and engage in critical thinking (KICD, 2019; Kitainge, 2022). Quality education is achieved through learners' active engagement in meaningful interesting tasks. Learning is best promoted through an active process that enhances interactions and the use of knowledge in real life situations (Kitainge, 2022; Fry, Ketteridge & Marshall, 2009; Kauchak & Eggen, 2011).

The integration of 21st Century skills in the instructional process can be done in a variety of modes as discussed in the sections that follow:

2.2.1 Integration through learning outcomes and content

Learning outcomes are the intended purposes to be achieved at the end of an instructional session, topic or programme. For learners to practice and develop 21st Century skills, the learning outcomes should be stated in measurable active verbs that give the learners the opportunity to develop the required competences. The revised Bloom's taxonomy is an effective framework that guides instructors in stating measurable learning outcomes for competences development (Anderson & Krathwohl, 2001; Syomwene, 2023). In 21st Century, the role of the teacher has changed from the role of an instructor to that of a guide and facilitator of learning (Greenwood et al. 2022; Kitainge, 2022; Olugbenga, 2021; Fry; Ketteridge & Marshall, 2009). This enhances active learner participation in the instructional process. Teachers should infuse 21st Century concepts in the content of various learning areas to permit learners to practice and develop the required skills.

2.2.2 Integration through learning activities

Learning activities are curriculum delivery activities that learners are engaged in for the achievement of the intended learning outcomes (Syomwene, 2023; Mwaka, Nabwire & Musamas, 2014). The integration of 21st Century skills can take the form of infusing learning activities that allow the practice and application of 21st Century skills. Bremner, Sakata & Cameron (2022) conducted a study on the outcomes of learner-centered pedagogy and found out that skills such as self-esteem, assertiveness, confidence and communication were strengthened by learner centered pedagogy. In addition, learner centered pedagogy enables learners to develop skills such as analysis, critical thinking, creativity and lifelong learning (Bremner, Sakata & Cameron, 2022). In active learning opportunities, content is meaningful and relevant to learners' real lives (Syomwene, 2023; UNESCO, 2002).

According to Syomwene (2023), interactive learning activities should permit learners to: do something, communicate, think, reflect, collaborate, solve problems, be creative, be critical, apply knowledge and skills to real life, and assess situations. Such activities develop the required 21st Century skills in the learners. For meaningful learning, the classroom environment has to be task oriented with hands on and minds on learning experiences (Kitainge, 2022; Kauchak & Eggen, 2011).

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2.2.3 Integration through instructional methods

Teachers can facilitate the development of 21st Century skills by integrating them in the instructional methods. Instructional methods are the procedures of content delivery (Mwaka, Nabwire & Musamas, 2014). Olugbenga (2021) states that 21st century skills such as creativity, problem solving, critical thinking can be effectively developed through learner centered methods as they encourage the learner to reflect on what they are learning and how they are learning it.

The integration is best done through the use of learner centered instructional methods that allow learners to participate in the teaching and learning process thereby developing the required skills. With learner centered methods, learners get the opportunity to experience real tasks and acquire 21st century skills and key competences through the process (Olugbenga, 2021). Some effective instructional methods for the development of 21st Century skills include inquiry-based learning, problem-based learning, project approach, discussions, question and answer method and use of real-life examples.

2.2.4 Integration through instructional resources

Instructional resources are materials that aid learning. Schools need to provide the required relevant resources for quality teaching and learning (Lezote & Snyder 2011). Effective resources for the integration of 21st Century skills are those that permit active learning experiences. These are resources that allow the learner to elaboratively explore the five senses: to see, touch, hear, smell and taste.

Effective integration of 21st Century skills can be achieved through integration of Information and Communication Technologies (ICTs) in education. Laar et al. (2020) postulates that ICT is an important medium for accessing and connecting information and problem solving. According to UNESCO (2002), ICTs are a major factor in shaping the new global economy and producing rapid changes in society. Fisser & Thijs (2015) opines that technology facilitates communication and collaboration skills. ICTs can provide powerful tools to help learners access vast knowledge resources, collaborate with others, consult with experts, share knowledge, and solve complex problems using cognitive tools (UNESCO, 2002).

2.5 Teacher support in the integration of 21st Century skills in the instructional process

As curriculum implementers, teachers require support in the integration of 21st Century skills in the instructional process. Teachers' support can take a variety of ways.

Teacher knowledge and skills are a pre-requisite in the instructional process. Teacher knowledge and skills is the extent to which the teacher has the relevant subject matter and pedagogical experience needed to teach the intended curriculum effectively (Lezote & Snyder, 2011). Teachers must have the knowledge and skills to help learners achieve high academic standards (Syomwene, 2018; UNESCO,

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2002). This makes teacher professional development a major priority in quality curriculum implementation (Syomwene, 2023). Teacher education programmes should prepare teacher trainees adequately for the integration of 21st century skills in the instructional process. Syomwene (2023) recommends for competency-based teacher education in which instructors train the learners to be thinkers and creators of knowledge through reflection and application of knowledge.

Teacher trainees can expand their knowledge and skills through experiential learning acquired through *mentorship by more experienced teachers*. Teacher trainees on teaching practicum receive mentorship from the university assessors and also from the cooperating teachers. A cooperating teacher is one that is assigned by the practicum school to mentor and guide the teacher trainee. In most cases, this is the teacher that hands over a practicum class to the teacher trainee and who the teacher trainee hand over to at the end of the practicum. In this case the teacher trainee benefits from peer observation and peer coaching that is effective for novice teachers (Syomwene, 2018). According to Lezote & Snyder (2011), effective schools require use of collaborative processes for quality education.

Apart from the mentorship by more experienced teachers and university instructors, teacher trainees have to establish interactions and communications amongst themselves to serve as *communities of practice*. A learning community is a group of people who share common values and beliefs and are actively engaged in learning together and from one another (Otunga, Odero & Barasa, 2011; KICD, 2019). In such forums, teacher trainees can learn from one another, share best practices, connect and encourage one another through purposeful interactions. Communities of practice can be done physically or virtually.

Schools should have the relevant *resources* for integration of 21st Century skills in the instructional process. Resources are the tools for the job (Syomwene, Nyandusi & Yungungu, 2017) and their availability and adequacy cannot be overemphasized. Insufficient resources affect the implementation of learner centered instructional methods (Kitaingi, 2022; Olugbenga, 2021). According to UNESCO (2002), for ICT integration in education, schools must have sufficient digital technologies and internet.

Teacher trainees require the *support of the school management* during the practicum. The school culture should be welcoming and flexible to permit creativity and innovation. Teacher trainees should be free to make enquiries and should be involved in all the schools' activities. The support from the school management can involve provision of resources, remunerations, motivation, and encouragement (Syomwene, Nyandusi & Yungungu, 2017).

The number of learners in a class can facilitate or impede learning. *Large class sizes* affect the implementation of learner centered instructional methods (Kitaingi, 2022; Olugbenga, 2021). Learner centered instructional methods are more effective in relatively small and manageable class sizes. Greenwood et al. (2022) reports a study in which challenges of classroom management were identified in the use of inquiry-based learning, especially where class sizes were large.

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3.0 Methods and materials

The study adopted a Mixed Methods approach and a descriptive research design. It targeted teacher trainees that had gone through teaching practicum in their programme of study. A sample of 114 teacher trainees from two public universities in Kenya were selected through stratified and convenience sampling methods to participate in the study. The 114 participants represented 30% of the target population. Students were grouped into various programmes. A WhatsApp link was sent to them to join a group on first come first service basis. When the optimum number of participants was reached, the admission to the group was closed. A google form link containing the questionnaire was then sent to the teacher trainees for them to respond. Data was collected in May and June, 2023 using students' questionnaires that comprised of both closed-ended and open-ended questions. The questionnaire was tested for validity and reliability before use. Ethical issues such as confidentiality, informed consent and anonymity were observed in the study. Data was analysed through descriptive statistics and thematic analysis.

4.0 Results and discussion

The study was guided by two research objectives; to investigate teacher trainees' experiences on integration of 21st Century skills and to find out constraints encountered by teacher trainees on integration of 21st Century skills in the instructional process. The teacher trainees' experiences were measured by the level of competence on integration of 21st Century skills, the extent of integration of 21st Century skills and the perspectives of teacher trainees on how they integrated the 21st Century skills in the instructional process.

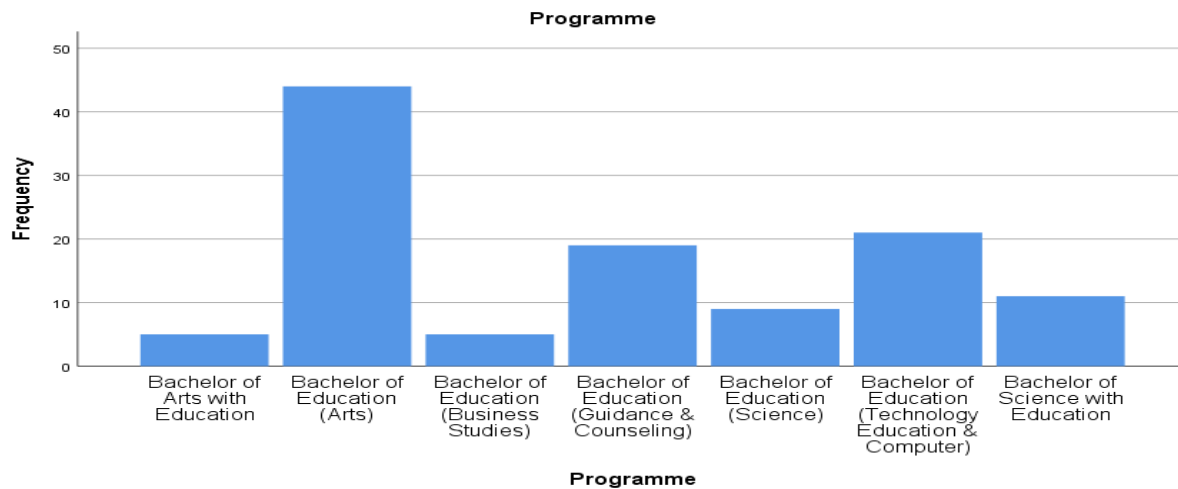
4.1 Demographic data of the respondents

The respondents comprised of 114 teacher trainees who had completed the teaching practicum from two public universities in Kenya. 56 (49.1%) teacher trainees were male and 58 (50.9%) were female. The respondents were selected from various teacher education programmes as presented in Figure 1.

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Figure 1. Study respondents by programme of study

4.2 The level of teacher trainee competences on the integration of 21st Century skills

Data was collected on the level of teacher trainee competences on the integration of 21st century skills in the instructional process during teaching practicum. The findings indicated that under ways of thinking, majority, 53 (46.5 %) and 60 (52.6 %) were not competent in the integration of critical thinking and creativity skills respectively and that majority of the respondents, 77 (67.5 %) and 73 (64.0 %) were not competent in the integration of innovation and problem-solving skills respectively. A key factor in the successful adoption of 21st century skills practices has always been the integration of practical knowledge and contextual information by teachers using the method of critical thinking and creativity (Jamilah, 2020).

Under ways of working, the findings showed that majority of the respondents, 49 (43.0 %), 66 (57.9%) and 70 (61.4%) were very competent in the integration of oral communication skills, written communication skills and collaboration skills respectively. These findings agree with Chu, et al. (2017) who state that for teachers to be successful in using 21st century skills in the classroom, teachers must improve their communication skills, be more creative and imaginative, and incorporate collaboration skills.

On digital literacy, majority of the respondents, 55 (48.2 %) and 56 (49.1 %) indicated that they were fairly competent in the integration of information literacy and technology literacy skills respectively. However, 65 (57.0 %) who were the majority were not competent in the integration of fact-checking skills. Technology enhanced learning makes learning more interesting and meaningful (Syomwene,

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2023). According to Mahmud and Wong (2022), one of the critical 21st Century skills required by university students is data literacy.

Pertaining life skills, the findings indicated that the teacher trainees were fairly competent in the integration of citizenship skills, 58 (50.9%). However, majority of the respondents, 53 (46.5%) and 49 (43.0 %) were very competent in the integration of leadership skills and adaptive skills respectively. Many respondents, 61 (53.5 %) and 62 (54.4 %) were not competent in the integration of networking and global awareness skills. According to Llego (2022) life skills are essential as they are designed to help pupils become competitive in the global market.

Table 1 summarizes the findings on the level of teacher trainees' competences on the integration of 21st Century skills in the instructional process during teaching practicum.

Table 1: Level of teacher trainee competences on the integration of 21st century skills

Skills		Very competent	Fairly Competent	Not Competent	Total
		F (%)	F (%)	F (%)	F (%)
Ways of thinking	Critical thinking	28 (24.6%)	33 (28.9%)	53 (46.5%)	114 (100%)
	Creativity	14 (12.3%)	16 (14.1%)	60 (52.6%)	114 (100%)
	Innovation	14 (12.3%)	23 (20.2%)	77 (67.5%)	114 (100%)
	Problem solving	19 (16.7%)	22 (19.3%)	73 (64.0%)	114 (100%)
Ways of working	Communication (oral)	49 (43.0%)	47 (41.2%)	18 (15.2%)	114 (100%)
	Communication (written)	66 (57.9%)	42 (36.8%)	6 (5.3%)	114 (100%)
	Collaboration	70 (61.4%)	46 (40.4%)	28 (24.6%)	114 (100%)
Digital literacy skills	Information literacy	7 (6.1%)	55 (48.2%)	52 (45.6%)	114 (100%)
	Technology literacy	12 (10.5)	56 (49.1%)	46 (40.4%)	114 (100%)
	Fact-checking	22 (19.3%)	27 (23.7%)	65 (57.0%)	114 (100%)
Living in the world/Life Skills	Networking	24 (21.1%)	29 (25.4%)	61 (53.5%)	114 (100%)
	Adaptability	49 (43.0%)	46 (40.4%)	19 (16.7%)	114 (100%)
	Leadership	53 (46.5%)	44 (38.6%)	17 (14.9%)	114 (100%)
	Citizenship	51 (44.7%)	58 (50.9%)	5 (4.4%)	114 (100%)
	Global awareness	20 (17.5%)	32 (28.1%)	62 (54.4%)	114 (100%)

4.3 The extent of integration of 21st Century skills

On the extent of integrating 21st Century skills in the instructional process, the findings revealed that the skills that were often integrated by majority of the respondents included: 47 (41.2 %) for oral communication skills; 66 (57.9 %) for written communication skills; 63 (55.3 %) for collaboration skills and 53 (46.5 %) for leadership skills. On the other hand, the skills that were rarely integrated by majority of the respondents included: critical thinking skills with 56 (49.1 %); creativity skills with 50 (34.7 %); information literacy skills with 50 (34.7 %); technology literacy skills 53 (46.5 %); adaptability skills with 49 (43.0 %); and citizenship skills with 51 (44.7 %).

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According to Martinez (2021), the ability to engage in independent critical thinking, and the high level of problem-solving is essential in pedagogy. The Partnership for 21st Century Skills (P21), (2009) opines that people in the 21st century live in a technology and media-driven environment, marked by access to an abundance of information, rapid changes in technology tools and the ability to collaborate and make individual contributions on an unprecedented scale.

In addition, the respondents indicated that they never integrated the following 21st Century skills during the teaching practicum: innovation, 65 (57.0%); problem solving, 62 (54.4%); fact-checking skills, 62 (54.4 %); networking skills, 58 (50.9 %) and global awareness skills, 61 (53.5 %). The Partnership for 21st Century Skills (P21), (2009) proposes the need to create learning practices that support the teaching and learning of 21st century skills.

Table 2 presents the summary on the findings on the extent of integration of 21st Century skills in the instructional process as indicated by the respondents.

Table 2. The extent of integration of 21st Century skills

Skills		Often	Rarely	Never	Total
		F (%)	F (%)	F (%)	F (%)
Ways of thinking	Critical thinking	46 (40.4%)	56 (49.1%)	12 (10.5%)	114 (100%)
	Creativity	22 (19.3%)	50 (34.7%)	42 (36.8%)	114 (100%)
	Innovation	22 (19.3%)	27 (23.7%)	65 (57.0%)	114 (100%)
	Problem solving	20 (17.5%)	32 (28.1%)	62 (54.4%)	114 (100%)
Ways of working	Communication (oral)	47 (41.2%)	40 (35.1%)	27 (23.7%)	114 (100%)
	Communication (written)	66 (57.9%)	42 (36.8%)	6 (5.3%)	114 (100%)
	Collaboration	63 (55.3%)	28 (24.6%)	23 (20.2%)	114 (100%)
Digital literacy skills	Information literacy	41 (36.0%)	50 (34.7%)	23 (20.2%)	114 (100%)
	Technology literacy	33 (28.9%)	53 (46.5%)	28 (24.6%)	114 (100%)
	Fact-checking	12 (10.5%)	40 (35.1%)	62 (54.4%)	114 (100%)
Living in the world/Life Skills	Networking	27 (23.7%)	29 (25.4%)	58 (50.9%)	114 (100%)
	Adaptability	46 (40.4%)	49 (43.0%)	19 (16.7%)	114 (100%)
	Leadership	53 (46.5%)	44 (38.6%)	17 (14.9%)	114 (100%)
	Citizenship	40 (35.1%)	51 (44.7%)	23 (20.2%)	114 (100%)
	Global awareness	24 (21.1%)	29 (25.4%)	61 (53.5%)	114 (100%)

The respondents when asked how they integrated the 21st Century skills in the instructional process, majority said that they linked class content to real life situations so as to encourage creativity and critical thinking. Also, the respondents indicated having used discussion and question and answer methods coupled with other learner centered activities to stimulate learning by doing, communication and collaboration skills. In addition, respondents indicated that they integrated digital skills through the use

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of their mobile phones and use of e-content. On the other hand, life skills were integrated through outdoor learning activities and engagement of learners in co-curricular activities.

4.4 Constraints encountered in the integrating the 21st Century skills the instructional process

The second research objective was on the constraints encountered in the integration the 21st Century skills in the instructional process during teaching practicum. The respondents perceived the following as serious challenges: limited knowledge from undergraduate training, 82 (72.0%); lack of materials and resources in the schools, 62 (54.4 %); limited time, 54 (47.4 %); lack of knowledge and skills on how to integrate the 21st Century skills, 50 (43.9 %); limited mentorship from the cooperating teachers and other staff in the schools, 48 (42.1%) and large class sizes, 44 (38.6 %). The mild challenges as perceived by the respondents included: limited knowledge on the meaning and significance of 21st Century skills, 46 (40.4 %) and limitations in the school culture and time table, 42 (36.8 %). Fisser & Thijs (2015) recommended that effective integration of 21st Century skills requires school support on curriculum development, professional development and learning resources. Martinez (2021) in a study on teaching and learning through project-based curriculum recommended the need for teacher capacity building capacity on development of 21st Century skills in learners.

The two top most serious challenges identified on the integration of 21st Century skills were limited knowledge from undergraduate training and limitations of materials and resources in the schools. Greenwood et al. (2022) in a study on student teachers' perceptions on enquiry-based learning identified challenges of classroom management, limited resources, facilities, and time especially where class sizes were large.

Table 3. Constraints encountered in the integration of 21st Century skills in the instructional process

Issues	A serious challenge	A mild challenge	Not at all
	F (%)	F (%)	F (%)
Limited knowledge from my undergraduate training	82 (72.0%)	20 (17.5)	12 (10.5)
Limited knowledge on the meaning and significance of 21 st Century skills	19 (16.7)	49 (43.0)	46 (40.4)
Lack of knowledge and skills on how to integrate the 21 st Century skills in teaching and learning	50 (43.9)	45 (39.5)	19 (16.7)
Limited mentorship from the cooperating teachers and other staff in the TP school	48 (42.1)	39 (34.2)	27 (23.7)
Limited mentorship from the Teaching practice coordinators and assessors from the university	33 (28.9)	11 (9.6)	70 (61.4)
Large class sizes in the TP school	44 (38.6)	41 (36.0)	29 (23.7)

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Lack of materials and resources in the TP school	62 (54.4)	38 (33.3)	14 (12.3)
Limited time	54 (47.4)	27 (23.7)	33 (28.9)
Limited collaborations with other students on TP	16 (14.0)	38 (33.3)	60 (52.6)
Limitations in the school culture and time table	33 (28.9)	42 (36.8)	39 (34.2)

5.0 Conclusions and recommendations

The first research objective delved to investigate teacher trainees' experiences on integration of 21st Century skills. The teacher trainees' experiences were measured by the level of competence on integration of 21st Century skills, the extent of integration of 21st Century skills and the perspectives of teacher trainees on how they integrated the 21st Century skills in the instructional process.

From the findings, the study concluded that teacher trainees were very competent in the integration of the following 21st Century skills: written communication, collaboration, leadership, and adaptive skills. The findings indicated that the teacher trainees were fairly competent in the integration of information and technology literacy skills and citizen skills. On the other hand, the teacher trainees indicated that they were not competent in the integration of the following skills: critical thinking, creativity, innovation, problem solving, fact-checking skills, networking and global awareness skills.

On the extent of integration of 21st Century skills in the teaching and learning process, teacher trainees indicated that the often integrated the following 21st Century skills: oral and written communication, collaboration and leadership skills. The following 21st Century skills were rarely integrated: critical thinking, creativity, information and technology literacy skills, adaptability and citizenship skills. The skills that were never integrated in the teaching and learning process as indicated by the teacher trainees were innovation, problem solving, fact-checking, networking and global awareness skills.

The teacher trainees indicated to have integrated the 21st Century skills in the instructional process in the following ways: reference to real life situations, use of discussion and question and answer methods, use of learner centered activities, use of mobile phone resources and e-content, use of outdoor learning activities and engagement of learners in co-curricular activities.

The second research objective investigated the constraints encountered by teacher trainees on integration of 21st Century skills in the instructional process during teaching practicum. The teacher trainees identified the following as serious challenges: limited knowledge from undergraduate training, lack of materials and resources in the schools, limited time, lack of knowledge and skills on how to integrate the 21st Century skills, limited mentorship from the cooperating teachers and other staff in the schools and large class sizes. The mild challenges identified were limited knowledge on the meaning and significance of 21st Century skills, and limitations in the school culture and time table, lack of collaboration at the schools, lack of support from the school management, and heavy workload. The two top most challenges identified were limited knowledge from undergraduate training and limitations of materials and resources in the schools.

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Based on the study findings and conclusions, the study made the following recommendations:

- i) That teacher education curricula should strengthen the integration of 21st Century skills in the instructional process for development of competences by the teacher trainees.
- ii) That the integration of the following 21st Century skills in the instructional process should be emphasized in the teacher education curricula: critical thinking, creativity, innovation, problem solving, information and technology literacy, fact-checking skills, citizenship, networking and global awareness skills.
- iii) Schools should be supported to acquire relevant resources on the integration of 21st Century skills in the instructional process such computers, internet, e-resources, text books and learning aids.
- iv) Emphasis on use of learner centred instructional strategies for integration of 21st Century skills in the instructional process.
- v) The need to strengthen the collaborations within the teaching practice schools for mentorship by the cooperating teachers on the integration of 21st Century skills in the instructional process.

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Conflict of interest

The authors declare that they have no financial or personal relationship (s) that may have inappropriately influenced them in writing this article.

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