INNOVATORY PEDAGOGY: SIMULATION STRATEGY IN TEACHER EDUCATION

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Abstract: The teacher is the most important element in any program of education. The teacher plays a critical role in implementation of the educational process hence it is imperative to invest in the preparation of teachers in terms of training so that the future of a nation is secure. Thus, teacher education is an important component and the main pillar of any system of education. Teacher education programs need to focus on a practice-based curriculum to increase teachers' competencies to meet the ever-increasing teaching standards demand and raise student achievement. The purpose of the study was to investigate the efficaciousness of simulation strategy in teacher-trainee preparation in the universities in Kenya. The study adopted Quasi-experimental design and in particular nonequivalent control group posttest-only. The respondents were third year student teacher in pre-service teacher education provided at the undergraduate level in the universities in Kenya. The sample size was 84 student teachers in selected universities in Kenya. The research instrument used was student teacher questionnaire and student assessment report. The data was analysed using both descriptive and inferential statistics involving t-test where the hypothesis was tested at α = 0.05 level of significance. Based on the findings of the study, it may be concluded that simulation strategy is an effective and useful strategy to develop teaching skills required to produce competent teachers. The study further revealed simulation impacts positively on mastery of teaching skills and prepares the student-teacher adequately for teaching hence it can be recommended that simulation be adopted in teacher training programs.

Keywords: Teacher Education, Simulation Strategy, Pedagogy, Student-teacher.

1.1 Introduction

Teachers are the most vital school-related factor influencing student learning hence teacher quality is increasingly seen as crucial to improving educational outcomes and pupil achievement. Thus, posing challenge to teacher education programs to find new ways to ensure that their graduates will be effective in highly demanding work settings (Kaufman & Ireland, 2016). Recent calls to improve the quality of education in schools have drawn attention to the importance of teachers' preparation for work in classroom setting (Badiee & Kaufman, 2015). The expanding responsibilities and expectations of the school teachers by the modern society piles pressure on teacher preparation institutions to reform their curriculum (Cook, Semmel & Gerber, 1999) and more so the pedagogy to equip student-teachers with necessary teaching skills, aptitudes and competencies (Espada, 2014). Grewal (2016) further noted that the revitalization and strengthening of the teacher education system is a powerful means for the upliftment of educational standards in any country. Otherwise, teacher education programs are under pressure to ensure that their graduates can produce measurable learning gains in their students in the face of growing criticisms that these programs are not prepared to graduate teachers for present conditions (Knight, et al, 2015). Darling-Hammond (1999) notes that when teachers are well-prepared in both content and pedagogy, it makes an enormous difference not only to their effectiveness in the classroom but also whether they are likely to enter and stay in teaching. Hence teacher training institutions need to reform teacher preparation and meet the complex demands of preparing teachers in order to produce competent teachers in tandem with the needs of society through innovative practices in teacher education.

The basic assumption is that; teacher behavior is modifiable by the use of feedback device, in that the underlying skill of teaching can be modified and practiced and teacher behavior can be identified. Behavioural skills in lesson planning, classroom management and communication skills cannot be totally developed through knowledge-based training methods alone but can be acquired best through practice (Salas et al., 2009). Although teaching practice has long been the traditional means for pre-service teachers to learn and practice classroom teaching, it does not always offer student teachers the time, safe practice experiences, repetition, or extensive feedback needed for them to gain adequate knowledge, skills, and confidence (Badiee & Kaufman, 2015). The skills can be cultivated through high-quality

opportunities to practice, coupled with support and feedback in simulation-based education which is the pedagogical approach of providing students with the opportunity to practice learned skills in real-life situations. Ajit (2020) affirmed that simulated teaching is a mechanism of feedback device to induce certain desirable behaviours among pupil-teachers by playing the role of teacher in their own group as an artificial situation of classroom teaching. Simulation which is a form of experiential learning leads the student teacher through all four processes of learning cycle: experience, thinking, acting and reflecting (Roberson, 2019). Gulzar (2020) noted that educational simulation tests learners' knowledge and skill levels by placing them in scenarios where they must actively solve problems. Hence simulation encourages higher-order learning, which promotes critical thinking abilities and self-directed learning (Kreber, 2001). Educators can use simulations as a creative way to integrate the knowledge, values, skills and cognitive and effective processes of the student, thereby creating opportunity for the student teacher to synthesize learning from the curriculum (Dodds, Heslop & Meredith, 2018). Kaufman and Ireland (2016) indicated that simulations can strengthen critical aspects of teacher preparation as teacher education programs look for ways to better equip their graduates for future challenges. In order for the student teachers to become successful teachers they need to acquire the teaching skill through role playing in the classroom by engaging an audience in active learning where participants learn from each other. Thus, in the quest for promoting the quality of preparing school teachers to play new roles in education and society there is need to employ innovative practice-based pedagogies such as simulated teaching strategy that promote concept attainment and use of critical and evaluation thinking through experiential practice.

According to Hopwood, Boud and Kelly (2016), simulation is regarded as an educational approach for learning as well as teaching applicable to different disciplines. Abdullah (2019), reported that simulation strategy is increasingly becoming a popular educational tool in the production of highly qualified professionals in the field of education, health, and applied sciences. The simulation strategy helps improve teaching practice effectiveness and student learning performance. Hopwood et al., (2016) remarked that learning that is based on simulation promotes the development of knowledge, attitudes, and skills of professionals whilst protecting unnecessary risks among consumers. Thus, simulated teaching is a teacher training technique used to bring about modification in the behavior of the student teacher. Simulation is role-playing or rehearsal in which the process of teaching is carried out artificially in authentic scenarios that is in a synthetic environment that is created to manage an individual's experiences in order to acquire attitudes, concepts, knowledge and skills for purposes of improving performance (Bell, Kanar and Kozlowski, 2008). Simulation is a method of teaching that allows learners to apply theory to practice in an integrated manner where a student-teacher is introduced to teaching in non-stressful conditions. Simulation provides an environment where student-teachers apply their knowledge, complex skills and competencies in a non-threatening and purposeful environment (Moreno & Mayer, 2007). Simulation is a form of experiential learning based on socio-drama and fits well with the principles of student-centred and constructivists learning and teaching strategy. Kaufman and Ireland (2019) asserts that simulation is a simplified but accurate, valid, and dynamic model of reality that allows users to encounter problem situations, test decisions and actions, experience the results, and modify behavior cost-effectively and without risking harm. Stoke (2014) also noted that simulations help build community through crowd-sourced knowledge, shared content creation and forums that promote dialogue and mentorship. The controlled, non-threatening synchronous learning environment of simulations allows for valid and moderation of pre-service teacher performance and self- efficacy (Dieker, Rodriguez, Lignugaris/ Kraft, Hynes, and Hughes, 2016). Since simulated teaching provide safe opportunities for student teachers to practice and improve their skills it can be proposed as a technique to bridge the gap between the classroom and the real environment. Hence teacher preparation programs need to embed instructional strategies during class time and offer opportunities to practice with support (Pomerance, Greenberg & Walsch, 2016). Simulated teaching is a mechanism of feedback device to induce certain desirable behaviours among pupil-teachers by playing the role of teacher in their own group as an artificial situation of classroom teaching (Mondal, 2020). Teacher training institutions need such programs which develop a wider range of practical experiences for student teachers in order to promote the ability in the pupil regarding problem solving behaviour.

Kaufman and Ireland (2019) pointed out that simulations provide opportunities to extend and enhance the practice, feedback, and assessment provided during teacher education. Espada (2014) revealed that simulation is an intensive, creative and comprehensive practicum experience within a synthetic environment that intends to elevate students' self-esteem and level of confidence in meeting the future challenges in teaching. Shami, Box, Fort and Gordon (2014) noted that simulation is projected as a powerful tool for creating more realistic, experiential learning environments thereby helping institutions meet the emerging demands for teacher training. Simulations develop an engaging and immersive learning experience that builds confidence and proficiency in teaching (Salas, Wildman &Piccolo, 2009).

Thus, simulations are becoming more common in pre-service teacher education for skills such as lesson planning and implementation, classroom management, ethical practice, and teaching students with varying learning needs (Kaufman and Ireland 2019). Teachers and students should accept the use of simulation in their classroom to enhance their classroom outcomes as advocated by Abdullah (2019). Dmitriy and Xiaoqiong (2020) revealed that simulation has the potential to improve not only student knowledge and skills, but also the motivation and satisfaction in the course. Despite several research findings showing benefits of student-centred practices such as simulations that is an approach to teacher professional learning that emphasizes opportunities for rehearsal and practice, the shift to adopt such strategy is slow.

Carrington, Kervin and Ferry (2011), argued that in pre-service teacher education, class-room simulations can help pre-service teachers to translate their theoretical knowledge into action through repeated trials without harming vulnerable students, and they can provide more practice time and diversity than limited live teaching practice sessions. An effective simulation produces a sense of realism that leads the users to regard the simulated world as real in some sense (Dieker, Rodriguez, Lignugaris/ Kraft, Hynes, and Hughes, 2016) and feel personal responsibility to improve their practice. Also, the role-play aspect of classroom simulations supports students in taking on and practicing unfamiliar teaching roles, developing new self-efficacy and professional identity over time (Gibson, Christensen, Tyler-Wood, & Knezek, 2011). Simulation is used in education to replace real experiences with guided experiences that evoke or replicate aspects of the real world. Simulation is described as an imitation of key characteristics of real events, situations or procedures (Girod & Girod, 2008) and develops the ability in an individual regarding problem solving behavior. Thus, simulation can be used prior to the classroom teaching practice with objective of developing teaching skills such as effective classroom management skills, use of instructional materials, teaching dispositions and effective use of communication skills as student-teacher experience the activity first-hand. Simulation affords pre-service teacher educators a controlled learning environment for moderation and diagnosis of practice of their students (Ledger & Fischetti, 2019). Thus, simulations can foster an exciting, energetic and engaged teaching environment with fairly good increase in student participation, motivation and preparation for simulation exercises (Maheshwari, 2016). However, there exists slowed widespread adoption of simulated teaching strategy in teacher education due to cost, simulation limitations, and lack of rigorous evidence as to the effectiveness of simulations. Hence the study explored the efficacy of simulation teaching strategy in student-teacher training to provide insights on practice-based pedagogy.

1.2 Statement of the Problem

Teacher training institutions around the world continue to prepare student teachers for the workforce using traditional strategies and employing similar teacher education programs ending up sending inexperienced student teachers into classrooms with actual learners during teaching practice. This is due to the fact that teacher education programs lack sufficient opportunities for novices to practice teaching in low stake settings effectively which leads to releasing teachers who are not well prepared for teaching practice. Therefore, teacher education programmes need to explore alternative ways such as simulated teaching strategy to ensure they produce pedagogically competent and proficient teachers to carry out tasks in schools. However, simulated teaching strategy full potential has yet to be realized within the context of effectiveness and contribution to better preparing student teachers for teaching skills through experiential practice. Hence the present study explored effectiveness of simulated teaching strategy in teacher preparation among student teachers.

1.3 Purpose of the Study

The purpose of the study was to investigate the efficaciousness of simulated teaching strategy in teacher preparation among prospective teachers.

1.4 Objective of the Study

The objective of the study was to explore the efficacy of simulated teaching strategy in student-teacher training.

1.5 Research Question

To determine the extent of student-teacher preparedness for teaching prior to teaching practice.

1.6 Hypothesis

H$_o$1: There is no statistically significant difference in performance in teaching practice between student teachers exposed to simulated teaching strategy and those exposed to conventional methods in teacher preparation.

2.0 Methodology

The study adopted Quasi–experimental research design that involves manipulation of an independent variable without random assignment of participants to conditions or counterbalancing of orders of conditions. The design was appropriate for the study since it eliminates the directionality thus conducted to evaluate the effectiveness of a treatment or an educational intervention. Specifically, nonequivalent group posttest-only design was used in which a dependent variable is measured following treatment in one group also in a non-equivalent control group that does not receive the treatment. The participants in one group were exposed to a treatment, a nonequivalent group was not exposed to the treatment, and then the two groups were compared.

The nonequivalent group posttest-only design is as follows;

Experimental Group (Treatment Group)	X	O1
Control Group (Nonequivalent control Group**)**	-	O2

Where:

X is treatment and O1 and O2 is Posttest.

The treatment involved learners assuming the roles of characters namely teacher, student and observer in predetermined scenarios. A system of rotating the role assignment was developed so that each student-teacher was provided with the opportunity to play the role of teacher, student and an observer in two sessions for each role. Three elements necessary for effective simulations; intensive lesson preparation, active student participation, and post-simulation debrief (Caniglia, 2019) were practiced. The student-teacher prepared micro-lesson using all the requisite skills of teaching like whiteboard writing, questioning, stimulus variation, reinforcement and use of examples then delivered the lesson to the class of peers. The observer and supervisor noted and recorded the performance (how the student teacher dealt with the individualized personalities of the students and used of requisite skills) for judging the student-teacher behavior. The treatment was conducted in six sessions followed by post-simulation debriefing step after each session. During the debriefing, participants received the feedback on the task from students and the teacher that helped him/her to recognize his/her weak points of teaching in order to improve his/her knowledge and skills. The student teachers were given sufficient time to reflect on the simulation results. The student teacher then repeated simulation experience and tried again to apply the evidence-based recommendation given on effective classroom management skills, use of instructional materials, teaching dispositions and effective use of communication skills.

The study targeted undergraduate students in Bachelor of Education program at 3rd level year and after completing teaching practice. Purposive sampling technique was used to draw the participants for the study giving a total of 84 respondents. The participants had not participated in teaching practice session so the treatment group was prepared for teaching practice using simulated teaching strategy while the control group was prepared using the traditional methods. The questionnaire was used to collect the required data that allowed the researcher to gain insight into the student teacher readiness for teaching practice. The questionnaire had two sections; section one had background characteristics of student teacher and section two was for collecting information associated with efficacy of simulation teaching strategy in preparing teacher trainee for teaching practice. The teaching practice marks obtained after assessment of student teachers for both experimental and control group were analysed.

3.0 Results and Discussion

The data obtained was coded then statistically and thematically analysed to achieve the purpose of the study in line with the objective of the study. The section presents the results obtained from the research findings.

3.1 Gender of the Participants

The participants were student teachers who were being trained to be science teachers. The results about their gender was represented on Table 1.

Table 1: Gender of the Respondents

Gender	Experimental group Frequency	%	Control group Frequency	%
Male	22	52	23	55
Female	20	48	19	45
Total	42	100	42	100

Results on Table 1 indicates that 52% of the respondents in the experimental group were male and 48% were female while 55% of the respondents in the control group were male and 45% were female. In the overall, 54% of the respondents were male and 46% were female. This implies more male students participated in the study than the female and may be due to science discipline where more men pursue sciences.

On the type of school, the student teachers attended the teaching practice, a total of 19% practiced in girls only schools, 22% in boys only schools while 59% practiced teaching in mixed schools. This alludes that majority of the student teachers handled students of both gender in their classes during teaching practice.

3.2 Preparedness for Teaching Practice

When student teachers in the experimental group were asked whether simulation training sessions they attended before teaching practice were useful to them, 45% agreed while 55% strongly agreed. This suggest that teacher trainees in the experimental group found simulations good for it provided a semi-realistic environment and exposure that helped them improve their presentation skills. It was noted that 3% of the teacher trainee disagreed that simulation sessions made them feel prepared for teaching practice, 3% were undecide while 47% agreed and 47% strongly agreed. It was noted that 94% of the teacher trainee stated that simulation sessions made them feel better prepared for teaching practice. The study findings concur with Turan, (2015) who stated that simulation provides an opportunity to demonstrate links between theory and practice to pre-service teachers and prepare them for practice. Also, Kaufman and Ireland (2016) noted that simulations can strengthen critical aspects of teacher preparation as teacher education programs look for ways to better equip their graduates for future challenges.

The study findings further revealed that when teacher trainees were asked whether simulations training sessions improved their communication skills, 6% disagreed, 6% were undecided while 44% agreed and 44% strongly agreed. Notably, 88% of the student trainee felt that simulation sessions had positive impact on their communication skills. Moreover, when student teachers were asked whether simulation sessions helped them improve their decision making in presentation, 3% disagreed, 16% were undecided while 53% agreed and 28% strongly agreed. A total of 81% of teacher trainee at least agreed that simulation sessions helped them improve in decision making in their microteaching presentation and also teaching practice. This insinuates that simulation sessions equip the student teachers with necessary skills in preparation for teaching practice. The study findings align with Girod and Girod (2008) who indicated that simulation help candidates become more aware of, and able to perform, several critical skills necessary to effectively connect teacher actions to the learning of each student. The results resonate with Kaufman and Ireland (2016) who affirmed that simulations can support screening for program admissions practice for improving teaching and classroom management skills and development of teaching dispositions. Also, Maheshwari (2016) affirmed that instructional simulations have the potential to engage students in deep learning that empowers understanding.

The study findings further established that 59% of the student teacher agreed and 35% strongly agreed that debriefing sessions and feedback was constructive and beneficial while 3% disagreed and 3% were undecided. It was observed that 94% of the student teachers agree that debriefing sessions and feedback were useful to them. About 45% of the student teachers agreed and 52% strongly agreed that it was helpful to observe colleagues during their own presentation while 3% were undecided. A total of 97% relatively agreed that it was helpful to observe colleagues during their own presentation. This hints that simulation sessions offered student teachers useful avenue where they

learnt from colleagues' presentations. The findings are in line with Maheshwari (2016) who noted that simulated teaching could be one of the most powerful tools in preparing college education students for a solid field teaching experience.

When students were asked whether simulation training sessions enabled them to acquire the teaching skills that were useful for teaching practice 41% agreed, 53% strongly agreed while 3% were undecide and 3% disagreed. Noticeably 94% agreed that the simulations sessions were useful and enabled them to acquire teaching skills that they used during teaching practice. The student teachers through simulations training sessions were able to develop skills for the teaching practice. The findings are consistent with AlBalawi et al (2022) who found out that simulation-based education enhances professional communication, helps students understand their roles and responsibilities, and increases situation awareness.

It was further noted that 41% of the student teacher agreed and 56% strongly agreed that simulation allow opportunity to correct errors without harassment while 3% of the teacher trainee were undecided. Moreover, 39% of the teacher trainees agreed and 49% strongly agreed that simulation reduce anxiety and fear to practice while 6% disagree and 6% strongly disagree. Around 47% of the student teacher agreed and 50% strongly agreed that participation in simulation sessions enhanced confidence and satisfaction in readiness for teaching practice while 3% strongly disagree. Noticeably 97% of student concur that simulation sessions inculcate values such as confidence that is paramount to the teaching practice. The findings of the study are in harmony with Teachmint (2021) who observed that simulated teaching inculcates a sense of confidence and authority in student teachers.

Moreover, 55% of student teachers agreed and 23% strongly agreed that teaching practice was enjoyable due to simulation sessions attended while 6% disagreed and 16% were undecided. A total of 78% of the teacher trainees stated that they enjoyed teaching practice due to the simulations training sessions they attended. The findings are in line with Abdullah (2019) who affirmed that simulation positively impacts teaching practice effectiveness as well as student learning performance. Therefore, efforts should be focused on the development and maintenance of simulation in learning and instruction in university settings. Hence simulation with proper integration in the course, serves as an effective teaching tool for experiential learning.

3.3 Effectiveness of Simulated Teaching Strategy

To capture the effectiveness of simulated teaching strategy the marks for teaching practice assessment results were analysed. The results are displayed on Table 2.

Table 2: Mean Scores of the Two Groups

Groups	N	Mean	Std. Deviation
Experimental	42	74.5238	3.29255
Control	42	65.1905	3.89019

Results on Table 2 shows that the average scores for experimental group and control group was 74.5238 and 65.1905 respectively implying the mean scores are different. The results of the present study evidenced that the experimental group that that were trained utilizing simulation teaching strategy had higher mean than the control group. Hence, the simulation supported teaching strategy is more effective than the conventional teaching strategy. The results were higher in the simulated group since in simulated teaching strategy, students-teachers were made more aware of their role, developed self-confidence in teaching and were able to analyze the teaching problems. The results are dissimilar with Shepherd et al (2010) who established that students who had been exposed to different forms of simulated teaching, showed no significant difference in performance within the cognitive and motor domains.

The hypothesis was there is no statistically significant difference in performance in teaching practice between student teachers exposed to simulated teaching strategy and those exposed to conventional methods in teacher preparation. The teaching practice scores were utilized by the researcher to evaluate the teacher trainee performance in the teaching practice using t-test. The findings were presented in Table 3.

Table 3. Independent t-Test Results

Groups	N	Mean	Std. Deviation	df	t	Sig.
Experimental	42	74.5238	3.29255			
Control	42	65.1905	3.89019	82	11.868	0.00

The independent t test results on Table 3 reveals that the mean score of experimental and control group were statistically significant at an alpha level of 0.05 (t = 11.868, p=0.00, p < 0.05). The t-critical = 1.984 and the t-computed= 11.868 meaning that t-critical< t-computed implying the null hypothesis was rejected. Thus, there is statistically significant difference in performance in teaching practice between student teachers exposed to simulated teaching strategy and those exposed to conventional methods in teacher preparation. The findings correspond with Guy and Lownes-Jackson (2015) who reported that simulation-based pedagogy improve student performance changing their behaviors, enhancing knowledge and providing best experiences. Moreover, Dolvin and Pyles, (2018) affirmed that Simulation has also been found to improve academic performance of the students in comparison to the lecture-based method.

4.0 Conclusion

Based on the results of this study the following conclusions were drawn; Simulated teaching strategy in teacher training provides experience to student teachers in instructional experiences for it actively engages student-learners in the application of knowledge and skills in realistic situations. Student-teachers that were engaged in simulations were adequately prepared for teaching practice since they acquired teaching skills through role-playing and had a chance to apply principles and theories learned and see how and when these principles work. Simulations pedagogy equip students with the necessary teaching skills, aptitudes and competencies thus support the development of teaching skills prior to field experience in real classrooms during teaching practice. Thus, simulated teaching strategy is a valuable and an effective way to improve pre-service teacher preparedness to teach. Simulation as a teaching strategy contributes to students' learning and deserve to be popularized as a useful educational intervention. The teaching practice assessment results for students exposed to simulations performed better than those ones for trainees prepared using conventional methods. Simulated teaching strategy provides trainees with the reinforcement to develop various teaching skills as it bridges the gap between theory and practice of teaching. Simulated teaching strategy as an innovative teaching practice with strong interdisciplinary approach then offer a promising and potential framework to advance practice-based professional training for teaching skills.

5.0 Recommendations

Simulation teaching strategy should be adopted in teacher education institution for high-quality teacher preparation due to its usefulness and other time and space benefits; Simulation teaching strategy helps in experiencing problem situation, enables trainees to study and analyze the teaching problems, explaining the behavior problems in the classroom and contributes to its solutions. The institutions that train teachers to create better infrastructures for simulation-based training in order to produce graduates that are ready for classroom with relevant competencies to meet demand for quality education. Simulated teaching strategy may be used in preservice teachers training to make teachers acquire the skills and some classroom manners necessary in promoting effective classroom interactions. Thus, simulated teaching may be used as a teacher training technique to bring about modification in the behavior of the teacher and introduce student teacher to teach in non-stressful conditions.

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