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PREPAREDNESS OF PRE-SERVICE TEACHERS IN USE OF ASSISTIVE TECHNOLOGY IN ADAPTED PHYSICAL EDUCATION IN SELECTED PUBLIC PRIMARY TEACHER TRAINING COLLEGES IN KENYA

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Abstract:
The terminology "assistive technology" (AT) refers to the apparatus, devices, and equipment, as well as the systems, services, adaptations, and processes employed by persons with special needs to support and facilitate their learning needs. Therefore, integrating AT facilities into physical education (PE) could equip special-needs learners with the skills to enhance their physical fitness and well-being, thereby rewarding their educational requirements. However, the adoption of assistive technology is not prevalent in special-needs schools despite the requirement by the Individuals with Disabilities Education Improvement Act (IDEIA). Consequently, learners with disabilities tend to lag behind in physical fitness in comparison to their unchallenged peers. The study incorporates quantitative research supplemented by qualitative methods to appraise the factors and processes that pre-service teachers of learners with disabilities consider, adopt, and utilize when integrating assistive technology in adapted physical education to meet their learners' needs. Additionally, the study evaluates assistive technology skills and knowledge levels among pre-service teachers to determine their adoption levels. Precisely, the study provides an overview of the different kinds of assistive technology facilities available in the Republic of Kenya for special-needs schools, as well as the modalities of their usage. Using the Theory of Normalization, Technology Acceptance Model, and Diffusion of Innovation Theory as its pedagogical frameworks, to this end, the researcher employed the Descriptive Survey Design when collecting data from 395

pre-service teachers, 21 tutors, and 3 departmental heads in three public teacher-training colleges (TTC) with a special-needs curriculum. Additionally, the researcher embraced both probability and non-probability sampling designs to come up with the study sample of 419 respondents. The researcher collected data through a survey by using self-reporting questionnaires, observations, interviews, as well as group discussions. The study included a pilot program for assessing the validity and reliability of the collected data. The Researcher's observations included facilities, assistive technology equipment, lessons, document review, and personal experiences relating to the research questions. The researcher then transcribed, categorised, and organised the qualitative data into themes, which she presented as narratives. Regarding quantitative data collected, the researcher used Statistical Package for Social Science (SPSS) to generate descriptive statistics, including the mean and standard deviation and inferential statistics, including the model R^2, ANOVA statistics, and chi-square tests presented in frequency distribution tables. The researcher embraced the model R^2 to establish the correlation between pre-service teachers' level of training or professional development and implementation of assistive technology in adapted physical education preparedness. The study concludes that the availability of AT facilities/equipment, training programs, learners' perceptions, teachers' attitudes, and institutional environment significantly influence the pre-service teachers' preparedness in applying AT devices in APE learning in the teacher training colleges in Kenya. Ironically, the study finds that a lack of adequate skills and awareness about AT devices and their usage in APE programs among the teachers training colleges' tutors significantly impeded the pre-service teachers' preparedness on APE in the randomly sampled colleges. Additionally, the study finds that engaging the various AT frameworks in the PE lessons of pupils with special needs positively influences the learning processes of special-needs learners. Consequently, the study recommends that the Ministry of Education (MoE) and other education stakeholders support TTC in acquiring adequate AT facilities for the pre-service teachers to allow them to embrace AT in APE because support by the relevant government agencies would enhance the quality application of the knowledge and skills learned for onward transfer to professional practice.

Keywords: preparedness of pre-service teachers, assistive technology, public primary teacher training colleges

1. Introduction

Increasingly, education development agencies are focusing on inclusivity issues in education. As a result, including learners with disabilities in the general classroom is now a prevalent practice. According to Pedersen, Cooley, and Hernandez (2014), people view education as a critical tool for socioeconomic growth and productivity because it increases individual earnings and, subsequently, reduces inequalities and poverty. They further note that it improves health and promotes democracy, good governance, and

robust leadership. In this regard, Carlson, Hemmings, Wurf, and Reupert (2012) observe that the international community passes various conventions and declarations that set targets to promote the availability of quality education by all, irrespective of their socio-economic status, religion, regional background, or vulnerability. Cologan (2014) suggests that education is a prerequisite to natural development since it is an indispensable means of unlocking and protecting human rights by providing the right environment for securing good health, liberty, security, and economic well-being. Additionally, it is necessary to participate in social and political activities.

While citing the Universal Declaration of Human Rights, the National Council for Special Education (NCSE, 2010) asserts that education is a fundamental right of every child and an opportunity to achieve and maintain an acceptable learning level. The Salamanca Conference reaffirmed this accord and renewed the world community's pledge at the 1990 World Conference of Education for All (EFA) to guarantee learning rights regardless of individual differences. The meeting marked a new point of departure for millions of children deprived of education by providing a unique opportunity to place special needs education within the broader EFA framework (United Nations Educational Scientific and Cultural Organization [UNESCO]), 2006).

Hettiarachchi and Das (2014) suggest that the 1999 World Summit on Physical Education noted that learners with physical disabilities participate in PE less frequently. Painting a grim picture of the PE situation among the special needs learners in Africa, the summit suggested that the continent takes a defensive position in PE matters for learners with disabilities. The conference observed that Africa experiences decreased curriculum, time, and budgetary allocations due to inadequate financial, material, and personnel resources for PE. Moreover, the summit noted that limited PE participation in Africa is due to its low status in society. As a result, authorities marginalize and undervalue PE in the continent. The forum further observed that PE appears to be under threat in most learning institutions worldwide.

During the United Nations Sustainable Development Summit in New York in September 2015, member states formally adopted the 2030 Agenda for Sustainable Development. The agenda contained 17 goals, including a new international education goal (SDG 4). SDG 4 aims to "*ensure inclusive and equitable quality education and promote lifelong learning opportunities for all people*" (Sustainabledevelopment.un.org, 2019, p.1). The discussion noted that every child has a unique characteristic, interests, abilities, and learning needs. The Sustainable Development Summit report argues that any education system's design and implementation should consider the diversity in learners' characteristics and needs. The forum observed that inclusive education considers all children's interests, whether with or without exceptional needs and therefore, in principle, education for all learners should be in regular schools. Consequently, the Sustainable Development Summit report supports UNESCO's (2012) suggestion that special needs learners' learning experiences should occur under the traditional school framework.

According to Dieringer and Judge (2015), PE permeates the various emerging issues in the world, such as the UN's Sustainable Development Goals (SDG), drug and substance abuse, environmental conservation, gender equity, and human rights, national wealth promotion, as well as cultural heritage.

To boost AT adoption in special needs education, waiving duty on all imported equipment and materials coupled with increasing local production is necessary. It would equip schools with special needs facilities. In this regard, Haapala (2012) argues that only by removing physical and social barriers to learning do we create truly inclusive classrooms and societies and speak of EFA in a holistic sense. Gathoni (2015) defines physical education as a planned instructional program with specific content and objectives. It is an essential part of the school curriculum because PE increases physical proficiency, health-related fitness, self-responsibility, and enjoyment of the learners' physical activity and helps pupils establish physical activity as a natural part of life. According to the Society of Health and Physical Educators (SHAPE) of America, "The goal of physical education is to develop physically literate individuals who have the knowledge, skills and confidence to enjoy a lifetime of healthful physical activity" (SHAPE America and Human

However, there is an increasing demand for tertiary education institutions to train teachers who contribute to all learners' overall improvement and achievement, including their physical well-being (Council for the Accreditation of Educator Preparation, 2015). The inclusion of special needs learners in conventional education classrooms remains a widely demanded practice, though (Marin, 2014). In this regard, teacher-educators must prepare the trainee-teachers for inclusive classroom practice. Nevertheless, this initiative's success depends on how the education sector stakeholders promote it since many individuals, organizations, and government programs aim to foster transformative physical activities (PA) for persons with disabilities.

Kooiman (2015) observes that outside the special needs community, there is a desire to see persons with disabilities live successful lives. Still, those who lack experience with the group fear their contact. Moreover, traditional teachers do not embrace special needs learners (Campbell, Gilmore, & Cuskelly, 2003; Southern, 2010). In this regard, most general teachers feel that they lack the training to deal with special needs pupils (Campbell *et al.*, 2003). They think that including learners with a disability in classrooms negatively affects their peers (Cairns and McClatchey, 2013).

2. Objective

- To evaluate the resources available for AT and the challenges special needs pre-service teachers encounter in implementing AT in APE

2.1 Hypothesis

HO_1: Most teachers' training colleges lack sufficient assistive technology for teacher trainees in adapted physical education.

3. Literature Review

3.1 Using Assistive Technology in Adaptive Physical Education

Adapted physical education (APE) defines a service delivery system, pedagogical coaching, rehabilitation, therapy, training, or empowerment conducted by qualified professionals to enhance physical activity and goal achievement of individuals of all ages with movement limitations and societal restrictions (Wilkins, 2016). Additionally, Davis (2007) defines APE as modified individualized teaching focused on children with gross motor delays. Qi and Ha (2012) state that nowadays, various learning institutions employ diversified assistive technologies to bring out learners' potential, provide them with communication opportunities, enable the curriculum to achieve objectives, and empower learners to participate in the education process.

The use of assistive technology in adaptive physical education is the least conceptualized. Yet, MoE can implement it with low-cost technology devices that are cost-effective, especially in inclusive environments accessible to every child and with or without challenges (McKnight and Davies, 2013). According to Wojcik and Douglas (2012), simple technologies can profoundly influence learners with special needs to carry out both academic and physical tasks. They particularly single out a rubber band to hold pencils as one of world history's most incredible inventions since it allows special needs learners to use a pen or pencil without a grip. In mathematics, MoE can effectively use technology to develop numeracy skills. In this regard, many report that Mathematics Explorer programs profoundly affect retaining the long-term memory of dyslexic learners associated with weak memories (Parvaneh *et al.*, 2011).

According to Odiango, Wamukoya, and Njororai (2010), high health-related fitness levels protect against degenerative diseases such as obesity, musculoskeletal disorders, and coronary artery diseases. Auxter *et al.* (2005) observe that for the central nervous system to develop normally, it needs a variety of stimulation achievable through APE. On the other hand, Oduro *et al.* (2010) contend that physical education effectively improves pupils' health-related fitness for those with physical disabilities. Erdem's (2017) study shows that various assistive technology devices positively influence learners with special needs when used in special education.

According to Connor *et al.* (2010), insufficient training on AT at the preservice training level is a significant hindrance in achieving meaningful integration and AT usage for learners with disabilities in special school settings. They note that teacher familiarity, confidence, and skill in choosing software and integrating AT into the curriculum are dependent on training and time for technology exploration. Therefore, Connor *et al.* (2010) note that AT's success and use by pupils with disabilities directly relate to their teachers' AT knowledge and skills. In this regard, they suggest that teacher preparedness

is the primary significant predictor of pupil AT use. Additionally, Bell, Cihak, and Judge's (2010) study notes that the importance of integrating AT into teacher preparation is a fact. Still, few universities provide certification or training in AT, and insufficient training limits teachers and therapists' number using AT in school settings.

However, despite the perceived benefits of APE, there is a severe decline in the quality time allocated for teaching physical education and sports for children and young people in schools and inadequate opportunities to participate in recreational sports out of school (WHO, 2013). For instance, in Hong Kong, the dominant cultural ideology is that children with disabilities should live at home with their families and attend schools specially designed for their particular disabilities (Linder and Sherril, 2002). They suggest that the establishment views participating in physical activity as a waste of time, blaming it for lowering academic achievement.

In Europe, where inclusive education is at the centre stage, Dyson and Gallannaugh (2008) indicate meagre participation of SNE in PE. For example, they note that 6% of learners with SEN participate in PE in Britain while 30% participate in Australia. Only Austria, Italy, Slovakia, Sweden, and the UK have obligatory PE lessons (Toloi *et al.*, 2016). However, they argue that most learners do not participate in PE due to many excuses justified based on their exceptional situation.

On the regional front, Itimu and Kopetz (2008) observe that many African countries view PE as having a peripheral value in the curriculum and accord it inadequate monitoring reported in Benin, Botswana, and Uganda. They suggest that most African countries have minimal or lack physical education teachers for children with disabilities. For instance, a Benin government official commented on his nation, "*We do not have any programme that deals with PE for the disabled"* (Itimu and Kopetz, 2008, p.155). In South Africa, physical education no longer exists as a school subject (Van Deventar, 2003).

In Kenya, Awuor (2014) observes that physical education, being an un-examinable subject at both primary and secondary levels, receives a wide birth because there is cutthroat competition for better grades. However, Awuor (2014) notes that PE is a compulsory subject in teacher-training colleges and a choice university subject. In Kenya, the SNE policy (2009) reinforces the importance of technology in enhancing teaching and learning among learners with disabilities. Awuor's (2014) study in Nyakach on the strategies used to teach APE established that APE teachers used various instructional strategies that included assessment, planning, task analysis, adaptations, and modifications. Additionally, the study found that schools had inadequate facilities that were not adapted to suit learners with physical disabilities. However, Gachunga (2009) contends that KISE stresses integrating AT in curriculum instruction about PE. Consequently, she suggests that there is a need to examine to what level this expertise is applied to the school situation.

4. Research Design and Methodology

The researcher employed a descriptive survey design to collect the qualitative data when interviewing tutors (n=21), departmental heads (n=3), and pre-service teachers (n=395) from primary teachers training colleges (n=3) from the three Kenyan regions described in Section 3.2. In this regard, Maazuk, Demotteo, and Festinger (2005) suggest that a descriptive survey method requires that respondents give their opinions on the study subject matter by answering the research questions asked through face-to-face interviews. Regarding quantitative data, the researcher used a questionnaire to collect quantitative data from the target group.

The researcher opted for a descriptive survey design with the mixed method in this study because studies had shown a scarcity of literature in this field in Kenya. The survey gave baseline information on the availability of facilities and equipment for preparing teachers to use AT in teaching APE. The survey also provided a general overview of the learners' preparation level in the school.

4.1 Participants

The study targeted three (n=3) public teacher training colleges (TTC) out of five (N=5) that taught Special Education Unit to their trainees and selected twenty-one (n=21) out of possibly seventy-five (N=75) tutors who specialize in PE in Kenya's TTC for face-to-face interviews. Additionally, the researcher decided to interview all the three (n=N=3) heads of PE departments and three hundred and ninety-five (n=395) out of a total population of one thousand six hundred and forty (N=1640) second-year teacher trainees in the three sampled TTC.

4.2 Sampling Procedure

The researcher purposively selected all the heads of departments because of their vast understanding of the sampled colleges' physical education curriculum implementation processes. Consequently, they allowed the researcher to access every section of the PE department since they were the custodians of all the past and present data on teaching and evaluating PE as a teaching subject.

The researcher used purposive sampling to select tutors (n=21) specialised in PE from the sampled colleges to get quality information. The researcher considered purposive sampling the suitable method to allow for focused information collection since the researcher wanted to select typical and practical cases according to Oso and Onen's (2002) assertion. Additionally, the researcher selected other teacher trainees randomly using the probability-sampling method. The researcher also used the purposive sampling technique to select the remaining pre-service teachers. The researcher used the purposive sampling method on the second-year teacher trainees on the assumption that they already received training on how to teach APE by using AT because they had already gone through the teaching practice. Therefore, the researcher employed both probability and non-probability sampling methods to select second-year teacher trainees from

College X (n=140), College Y (n=130), and College Z (n=125), bringing the cumulative pre-service teachers respondents' number to three hundred and ninety-five (n=395). The researcher decided on the sample size based on Nassiuma's (2000) mathematical formula:

$$n = \frac{NC^2}{C^2+(N-1)e^2} n = \frac{NC^2}{C^2+(N-1)e^2}$$

Where "N" is the population size in the selected colleges and "n" is the deserving sample size. On the other hand, "C" is the coefficient of variation with a value of 0.67. According to Nassiuma (2000), in most social science research, the coefficient of variation is usually in the 30-70% range. Consequently, this study opted for the 67.10% used by most science researchers (Nassiuma, 2000). Finally, "e" represents a margin of error, assigned a figure of 0.05.

5. Results and Discussions

5.1 Facilities and Equipment Availability in Teaching of APE in Teachers' Training Colleges

To gauge the available AT equipment and facilities that teacher training colleges employ while instructing trainee teachers in APE in Kenya, the researcher interviewed heads of departments, tutors, store-keepers, and teacher trainees and conducted classroom observations. Sub-sections 4.2.3.1 – 4.2.3.4 summarise the findings.

5.2 HoD Views on AT Facilities' Availability

The researcher devised an interview technique to gather pertinent data on the available AT facilities for instructing trainee teachers on APE. Using open-ended questions, the researcher ensured the questions were similar for the three institutions sampled to substantiate the research questions and null hypotheses. Therefore, the researcher focused on the PE departments of the three institutions that admitted both the challenged and non-challenged pre-service teachers.

The three PE departmental heads interviewed listed their responsibilities and those assigned to the trainee teachers. All the HoDs manage the departmental functions. Their duties dictate that they promote the teaching and learning process of APE by undertaking activities such as securing stationery and equipment, promoting quality professional protocols by tutors such as schemes of work, lesson plans, course outlines, and records of assignments given. Similarly, they handle any challenges/issues reported in the departments by trainees or tutors. Additionally, they propose amicable solutions to prevent the escalation of challenges.

According to college Y's HoD about the presence of AT facilities to facilitate APE teaching, he noted that AT facilities available at the teachers' training college include goal balls and braille teaching aid. The college employs special personnel to guard them. The HoD in college Y, when asked how the college utilized the available AT facilities, noted, *"In rare occasions, the technicians attached to these facilities attend workshops to get updated on*

new advances and how to use and operate them." He added, *"It's good for the government to provide more AT facilities to cater for the growing number of disabled pupils. And, as technology advances, new AT equipment needs to be checked in the market and be availed to institutions having pupils with APE programs"*. In college X, the HoD said there were few AT facilities in the institution, while there were no AT facilities, as emphasized by college Z's HoD.

The findings in the three teachers' training colleges support the null hypotheses *HO_1: In most of the teachers' training colleges, there is no sufficient access to assistive technology for teacher trainees in APE* and, *HO_2: Most teachers' training colleges lack sufficient assistive technology for teacher trainees in adapted physical education.*

5.3 Tutors' Views on Availability and Usage of AT Facilities in APE Programs

The researcher used questionnaires and interviews to gather the tutors' views on the available AT facilities in the three target colleges and their usage in teaching APE Programs. According to the three interviewed tutors in college X, the institution did not fully support the implementation of the AT knowledge base to promote APE for challenged learners. College X tutors outlined the challenges they faced while implementing the APE curriculum. They noted that the challenges include few AT facilities in the institution (45%), tutors' lack of knowledge in using AT facilities (30%), no special programs set aside to impart knowledge or teach the trainees about the use of AT facilities in APE (11%). At the same time, the institution lacked adequate funds to allocate to the PE department (14%). Additionally, they noted that the trainees undertook more theoretical studies and less practical classes. Consequently, this finding supports the first four null hypotheses:

HO_1: In most teachers' training colleges, there is no sufficient access to assistive technology for teacher trainees in APE.

HO_2: Most teachers' training colleges lack sufficient assistive technology for teacher trainees in adapted physical education.

HO_3: There is a lack of awareness among trainee teachers about the importance of the various assistive technologies usable in APE.

HO_4: There is a significant gap in training pre-service teachers about assistive technology usage in adapted physical education.

When asked, *"How accessible are AT equipment/ devices for your practice?"* College X group three tutors noted, *"We've never come across any, therefore, know little about it."* It is a worrying trend that the apathy levels in college X's administration regarding the availability of AT equipment or devices negate APE lessons for both the challenged and non-challenged teacher trainees. Thus, one of the tutors suggested, *"The government does not take into consideration the importance of AT facilities in institutions with teacher trainees who are challenged."* The suggestion further echoes null hypothesis HO4. Moreover, the tutors argued that all relevant stakeholders in the institution should develop ways of ensuring there were enough AT facilities and trained tutors on AT equipment usage.

The analysed data for college Y differed slightly from that of college X. The three interviewed tutors had extra information on the institution's status in supporting the use

of AT facilities in APE lessons. Therefore, the tutors agreed that there were several AT facilities in the institution, such as goal balls and braille, but they were not enough compared to the college's number of trainees. Therefore, they suggested the need for additional facilities at the TTC. One tutor claimed to have seen only one AT facility which is the goalball, and added, *"The facility is not even used as most tutors lack adequate knowledge on how to use it."* Here, too, the narrative supports null hypotheses HO_1 - HO_4.

Additionally, college Y tutors noted that they often taught pupils subjects that are more theoretical without including practical lessons. However, most understood how the AT facilities available worked, noting that their theoretical knowledge enabled them to apply their knowledge during exercises. The tutors further argued that their institution had no programs for training tutors to use AT facilities, thus revealing the special education policy implementation gap in the institution. Consequently, according to the Special Education Policy (2009), one would recommend that it is prudent for the government to provide AT facilities to all institutions with special needs education for pupils living with disabilities to access APE. Therefore, additional determinations are necessary to advance AT usage in teaching APE in the teacher training programs in the Republic of Kenya to support the well-being of learners with disabilities. In this regard, Hettiarachchi and Das (2014) and Muwana and Ostrosky (2014) postulate that teachers who have a primary special education component to their training are much more likely to maintain positive views about inclusive education and report higher self-efficacy around adapting classroom practices.

Finally, the tutors interviewed in college Z also gave information regarding their institution. They noted that the duties assigned to them include:

- Implementing the APE curriculum;
- Evaluating APE programs;
- Demonstrating leadership; and
- Executing instructions of the HoD and teaching.

Concerned, the tutors noted they had a special needs education program in their institution, but there were no AT facilities to support the teaching of APE. Besides, the tutors did not know the usage of AT facilities even if they were present. *"There's a lot to be done if proper APE programs are to be started,"* commented one tutor. The tutors blamed the government for making less effort to avail adequate AT facilities to all institutions with special needs education to support APE programs as outlined by the Special Education Policy (2009). Consequently, the findings here also support null hypotheses HO_1 - HO_4.

The tutors also held the institution's management responsible for not making fruitful advances towards certifying the government installed the necessary facilities, which would support a quality APE curriculum. In this regard, the tutors felt that the management failed to engage the education sector personnel to pressure the government to upgrade the AT facilities in the TTC institutions supporting learners with disabilities. One tutor argued, *"Provision and implementation of AT (in the classroom) require the involvement and services of several professionals in a multidisciplinary team."* Therefore, it is

worrying that while other institutions with similar APE programs had some AT facilities, college Z had nil AT facilities. The tutors termed it discrimination, which is ironic since the same government continues admitting large numbers of challenged trainees at the institution year after year.

5.4 Classroom Observations on the Available AT Facilities/Equipment

The researcher undertook classroom observations during the APE lessons to gather more data. It emerged that only two (colleges X and Y) of the three institutions had at least standardized teaching methods. Consequently, college Z lacked standardized APE programs.

In institutions X and Y, the AT use facilities guaranteed all the trainees would participate during the APE lessons since practical APE lessons are mandatory in both colleges. Despite the inadequate AT facilities in terms of equipment to trainee ratio, at least the learners in colleges X and Y received training on teaching an APE lesson. For example, the teacher trainees in both colleges knew how to utilize AT equipment such as goal balls. Although not up to par, the progress made by both colleges X and Y in implementing the APE curriculum to the teacher trainees is laudable. Consequently, other TTC institutions, such as college Z, ought to emulate the APE teaching methods of colleges X and Y since the TTC graduates would teach learners irrespective of their physical state once they engaged in teaching as a career.

On the other hand, college Z only taught theory lessons on APE and offered no field lesson observation. However, the tutors made an effort to explain some of the AT equipment used while teaching a practical APE lesson. However, despite their effort, it emerged those college Z trainees lacked hands-on experience in using AT to teach APE. The effect is immense on the pre-service teachers' capabilities. Therefore, Muwana and Ostrosky (2014) emphasize that special needs teachers experience difficulties determining their pupils' needs, identifying and using the assistive technologies used in the classroom, and allocating adequate time to use assistive technologies in the pre-school period. Furthermore, they suggest that teachers teaching special education programs need guides that include sample practices for the teaching process, guide applications, and technical support. The finding echoes null hypothesis *HO_5: Pre-service teachers' level of training significantly influences the implementation of assistive technology in adapted physical education preparedness*.

5.5 Responses Given by Storekeepers on AT facilities/ Equipment Availability and Use

The researcher also interviewed the storekeepers of the three institutions, X, Y, and Z, about the available AT facilities and equipment out of the concern they could have additional information on AT inventory. The researcher targeted at least one storekeeper per institution. It emerged every institution had its rules and regulations concerning the storage of sports equipment. However, the practices served for accountability of the procured AT facilities regarding numbers, functionality, and safety.

The college X storekeeper highlighted some AT facilities and equipment available to support APE programs. They included goalball, sound balls, and tactile aids. He noted there were seven goalball and twenty tactile aids, which proved a gesture in implementing the APE curriculum even though the trainee-to-equipment ratio is still low. Therefore, the chance of using AT in the teaching APE in this institution is high.

Additionally, college X's AT facilities/equipment were in good condition, with none requiring urgent repair. Regarding storage, no one could access the Games Store that housed the equipment unless authorized. Consequently, any person accessing the room had to get the consent of the storekeeper. The only exceptions were the HoD and the executive institution committee. "*To access the room is not that easy because occasionally, the storekeeper will be out of reach*," commented one tutor, and one is forced to improvise or teach without the AT equipment.

On the other hand, college Y's storekeeper had different views concerning the availability of the AT facilities and equipment for APE programs in the institution. He suggested there were several facilities and equipment in the institution. They included ten goal balls, one valley ball with ringing balls, one volley Pitch with lowered nets, a netball court, and a basketball court with dropped baskets. The facilities and equipment were in good condition due to regular repairs and maintenance. The storekeeper ensured they were in good condition, a failure to which he became accountable. As in college X, the storekeeper stated that the institution designed a room to keep the equipment. Therefore, they were stored correctly, and only authorized personnel accessed them. Moreover, he noted a regular maintenance schedule for the equipment, whereby he repaired breakdowns instantly.

However, the situation was cold for college Z as no storekeeper gave credible information. When asked about the storekeeper, the HoD replied there was nothing to guard, and thus, it was not appropriate to employ one. Instead, the HoD kept the game equipment in his office in a corner. In addition, there was no AT equipment. For an institution rated by the government as having a special education unit, it failed to support the APE curriculum. According to Wojcik and Douglas (2012), simple technologies can have a profound effect in enabling learners with special needs to carry out both academic and physical tasks. They single out using a rubber band to hold a pencil as one of the greatest inventions in world history. The TTC could introduce these simple technologies as a starting point and other less expensive ones.

5.6 AT Facilities and Equipment Observation Checklist

The researcher devised an AT facilities/Equipment observation checklist to confirm the presence of the AT items in institutions X, Y, and Z. Apart from conducting interviews to obtain factual data. The researcher found it prudent to make personal observations. In this regard, the store observation made in college X revealed some AT facilities/equipment, including seven goalballs, seven sound balls, 20 tactile aids, and 20 hearing aids. Tutors used them in teaching APE sessions hence influencing APE knowledge to the teacher trainees to produce quality graduates per Kenya's Special

Education Policy (2009). The presence of AT facilities/equipment in college X supports the proposals of implementing special needs education recommended by Rudabaugh (1993), who affirms the importance of financing and expediting AT facilities adoption in institutions with pupils living with disabilities.

Likewise, the observation conducted in college Y revealed several AT facilities/equipment present. The store observation affirmed the courts' presence, where teacher trainees undertook their practical events during APE lessons. Ten goalballs were used in teaching APE to visually impaired learners, and they were among the equipment observed. Other observed facilities included a volleyball court and netball and basketball courts with special fittings to support the challenged trainees. The researcher attests that all the courts were in good condition due to regular maintenance.

Additionally, the researcher established a sign language interpreter's presence. The latter accompanied tutors during classroom and field lessons. The researcher found the inclusion of a sign language interpreter in college Y's APE curriculum a plus. It aided trainees with hearing difficulties in comprehending the lessons, leading to quality learning outcomes.

In college Z, as already stated, the researcher found not a single AT facility/equipment for APE instructions. However, the researcher found that the institution's tutors used meaningful teaching strategies during instructions, e.g., role modeling, to enhance trainees' understanding, which could prove influential in the field. Thus, the researcher concluded that the college lacked AT facilities and equipment. In concurrence, Penton and Gustafson (2014) contend that despite the high need for and use of assistive technology, unmet needs exist for access and procurement.

Table 4.6: ANOVA for college X

Variables	Treatments	Sum of Squares	df	Mean Square	F	Sig.
Facilities handling APE	Between Groups	0.048	1	0.048	0.143	0.721
	Within Groups	1.667	5	0.333		
	Total	**1.714**	**6**			
Availability of AT facilities	Between Groups	0.012	1	0.012	0.006	0.94
	Within Groups	9.417	5	1.883		
	Total	**9.429**	**6**			

6. Conclusion

The pertinent challenges that the study found to influence pre-service teachers' adoption and utilization of AT devices for their successful APE instructions included the availability of AT facilities/equipment, training programs instituted for tutors and learners, and the learners' perceptions. Other critical factors considered included tutors' attitudes and the institutional environment that significantly influences pre-service teachers' preparedness in applying AT devices in teaching APE in Kenya's primary schools. The study found that two out of the three-sampled TTC had AT facilities and

equipment, albeit in inadequate quantities, that would satisfactorily cater for all the pre-service teachers' training. Additionally, the study established a low adoption of AT devices in Kenya's teachers' training colleges due to the tutors' poor/inadequate knowledge of their application. On their part, the tutors blamed their inadequacies on the institutions' lack of programs that would develop them in AT facilities usage. Despite these colossal omissions, the pre-service teachers opined that the knowledge they acquired from training would help them a lot once they graduated. In the college environment, based on their training, they could apply their knowledge and help their challenged peers undertake PE activities in the field and during their teaching practice. However, they still felt they faced a myriad of challenges in acquiring AT facilities usage skills for APE learning since they lacked exposure to various AT devices and sporting activities.

6.1 Recommendations

The study makes several recommendations in this section. First, the Ministry of Education should re-evaluate government support to facilitate the acquisition of teachers' training colleges' AT facilities to support APE programs for pre-service teachers. Such an initiative would require the finance ministry to incorporate AT facilities and equipment purchases in the national budget. Furthermore, there is a greater need for the finance ministry to liaise with development partners for grants for AT facilities' assets.

Conflict of Interest Statement

The authors declare no conflicts of interest.

References

Auxter, D, Pyfer. J, Huetig. C. (1993). *Principles and methods of adapted physical education and recreation*. St. Louis 7th edition, Mosby Yearbooks. Retrieved from https://archive.org/details/isbn_9780697392497

Bell, S. M., Cihak, D. F., & Judge, S. (2010). A preliminary study: Do alternative certification route programs develop the necessary skills and knowledge in assistive technology? *International Journal of Special Education, 25*, 110-118. Retrieved from https://eric.ed.gov/?id=EJ909041

Carlson, L., Hemmings, B., Wurf, G., & Reupert, A. (2012). The instructional strategies and attitudes of effective inclusive teachers. *Special Education Perspectives, 21*(1), 7–20. Retrieved from https://researchoutput.csu.edu.au/ws/portalfiles/portal/8841015/PID40243manuscript.pdf

Cologan, K. (2014). *Inclusion in education: Towards equality for pupils with disability.* Children and Families Research Centre Institute of Early Childhood Macquarie University. Macquarie University Press. Retrieved from

https://www.pc.gov.au/inquiries/completed/childcare/submissions/post-draft/submission-counter/subdr903-childcare-appendix3.pdf

Connor, C., Snell, M., Gansneder, B., & Dexter, S. (2010). Special education teachers' use of assistive technology with pupils who have severe disabilities. *Journal of Technology and Teacher Education, 18*, 369-386. Retrieved from https://eric.ed.gov/?id=EJ913649

Dyson, A., & Gallannaugh, F. (2008). Disproportionality in special needs education in England. *The Journal of Special Education*, *42*(1), 36-46. Retrieved from https://doi.org/10.1177/0022466907313607

Erdem, R. (2017). Pupils with Special Educational Needs and Assistive Technologies: A Literature Review. *The Turkish Online Journal of Educational Technology – January 2017*, volume 16 issue 1:128. Retrieved from https://files.eric.ed.gov/fulltext/EJ1124910.pdf

Hettiarachchi, S., and A. Das, (2014). Perceptions of 'inclusion' and perceived preparedness among school teachers in Sri Lanka. *Teaching and Teacher Education*, v. 43, p. 143-153. https://doi.org/10.1016/j.tate.2014.07.003

Judge, S., & Simms, K. A. (2009). *Assistive technology training at the pre-service level: A national snapshot of teacher preparation programs*. Teacher Education and Special Education, 32(1), 33-44. Retrieved from http://dx.doi.org/10.1177/0888406408330868

Marchzyk, G, Dematteo; D and Festinger, D; (2005). *Essentials of Research Design and Methodology*; New Jersey. John Wies & Sons. Inc. Retrieved from https://rlmc.edu.pk/themes/images/gallery/library/books/Behavioral%20Science/Essentials%20of%20Research%20design%20&%20Methdology.pdf

Odiango R., Wamukoya E. and Njororai, S. (2010). Effect of physical education on the health of physically challenged pupils. *Journal of Applied Biosciences 4*(4).

Okumbe, J., A. (1998). *Education Management; Theory and Practice,* Nairobi University Press. Retrieved from https://eric.ed.gov/?id=ED446375

Oso W. & Owen, D. (2004). *A general guide to writing a research proposal and report*. Kisumu. Option Press.

Oswald, M., and E. Swart (2011). Addressing South African Pre-service Teachers' Sentiments, Attitudes and Concerns Regarding Inclusive Education: *International Journal of Disability, Development and Education, v. 58*, p. 389-403. http://dx.doi.org/10.1080/1034912X.2011.626665

Parvaneh, A; Mohammad H; Bijan, Z; Poorya, P and Maryam, N. (2011). Effects of assistive technology instruction on increasing motivation and capacity of mathematical problem-solving in dyscalculia pupils. *Educational Research* Vol. 2(10) pp. 1611-1618. Retrieved from https://www.interesjournals.org/abstract/effects-of-assistive-technology-instruction-on-increasing-motivation-and-capacity-of-mathematical-problem-solving-in-dys-17415.html

Qi, J. & Ha, A. S. (2012). Inclusion in Physical Education: A review of literature. *International Journal of Disability, Development and Education. 59*(3), 257-281. https://doi.org/10.1080/1034912X.2012.697737

UNESCO (2005). *EFA Global Monitoring Report; The quality imperative*. Paris; UNESCO. Retrieved from https://www.unesco.org/gem-report/en/efa-quality

Wojcik, B. W. & Douglas, K. H. (2012). *Illinois assistive technology guidance manual*. SEAT Center. Special Education Assistive Technology. Illinois State University. Retrieved from https://www.isbe.net/Documents/assist-tech-guidance-manual.pdf