

FINAL REPORT OF THE PROJECT: APPLICATION OF DIGITAL TECHNOLOGIES IN ENHANCEMENT OF LEARNING EXPERIENCES FOR GIRLS WITH DISABILITIES IN KILIFI COUNTY, KENYA

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Executive Summary

The use of digital technology in education is one of the most effective ways of reducing barriers to quality education for all children and particularly those with disabilities. Globally, there has been inequality in access to digital literacy and there is a major gender gap where girls often have less access to technology. In Kenya, the Competency-Based Curriculum puts a lot of emphasis on digital literacy. This project examined assistive and digital technologies that can support the learning of girls with intellectual disabilities in Kilifi County. The project answered the following questions: [1] Which assistive and digital technologies have girls with intellectual disabilities interacted with in their learning experiences? [2] What is the digital knowledge level of girls in the use of assistive and digital technologies to enhance their learning experiences? [3] What is the digital knowledge level of teachers on the use of assistive and digital technologies to enhance learning for girls with intellectual disabilities? [4] To what extent does the use of digital technology enhance the acquisition of adaptive skills for girls with intellectual disabilities? [5] What are the challenges in implementing the use of assistive and digital technologies in the teaching and learning experiences for girls with intellectual disabilities? The study addressed five null hypotheses that tested whether use of digital knowledge availed in the study experiment significantly improved learner's communication skills, self- care skills, social skills and academic skills.

The project used an experimental design with pre-test and post-test for control and experimental groups. The target population consisted of 1,247 girls with intellectual disabilities and 198 class teachers. Using stratified random sampling and purposive sampling techniques, 104 girls with intellectual disability and 26 class teachers were sampled.

Simplified interview schedules for girls with intellectual disabilities, questionnaires for class teachers, observation schedules, Adaptive Behaviour Skills Checklist and a Focus Group Discussion with sampled class teachers were used for data collection. A pre-test and post-test were done to determine the change in adaptive skills of the girls after interacting with tablets loaded with the digital content. Teachers were trained on pedagogical skills and use of digital technology to enhance learning for the girls. SPSS was used to generate frequency tables to represent emerging trends, and the non-parametric Wilcoxon signed–rank test for related pair samples to test whether the adaptive skills of girls differed significantly between the pre-and post-tests, and between the control and experimental groups. Qualitative data was summarized into themes and analyzed to generate thematic patterns.

Findings indicated that digital technologies were inadequate; and assistive technologies were unavailable: 84.6% of schools reported having no computers, while 58% did not have tablets. While 42% of schools had tablets, the tablets did not have content that was at the level of learners with intellectual disabilities. Both learners and teachers had limited digital skills and experienced challenges in implementing the use of digital technologies. However, the digital knowledge level and acquisition of adaptive skills for girls with intellectual disability improved after interacting with the tablets. The pre and post-test analysis using Wilcoxon Signed Ranks tests showed significant improvement in adaptive behaviour of the girls: self-care skills (-3.396, p < .05);

communication skills (-3.210, p < .05); social skills (-2.754, p < .05); and occupational skills (-1.998, p < .05). There was significant improvement in the digital knowledge level for teachers in the experimental schools after the training and use of the tablets.

The study recommends that the Ministry of Education and other stakeholders should provide digital technologies with appropriate software for girls with intellectual disabilities. Teachers and the learners should be trained to use these technologies, as well as active monitoring of the use of the assistive technologies to enhance the teaching and learning experience and outcome of girls with intellectual disabilities. It was recommended that digital and assistive technologies should be provided in special schools and special units, as well as the re-tooling of teachers in the application of digital technologies to enhance learning for girls with intellectual disabilities in schools. It is expected that the research findings from this project will guide stakeholders in the education sector in Kilifi County to identify the gaps that need to be filled to ensure the advancement of the digital literacy education of girls with intellectual disabilities in the county. Such provisions will contribute to quality education for girls with intellectual disabilities in Kilifi County and the achievement of the Sustainable Development Goal (SDG) 4, for equitable quality education for all. The study findings will also inform the county and national education policymakers to come up with better strategies for planning and implementing digital literacy in special schools and units. Consequently, these strategies may improve the lives of girls with intellectual disabilities and compensate for their functional limitations, by enhancing their ability to engage and participate in typical daily activities and interactions. Improved digital literacy among girls with intellectual disabilities will promote the quality of education by allowing collaboration, creativity, communication and critical thinking. Furthermore, and very importantly, digital literacy will enhance the use of technology and interaction with the world around them leading to a more inclusive community.

Keywords: Adaptive behavior, Assistive technologies, Digital literacy, Intellectual disability, Special School, Special Unit

1.1 Background of the Study

Technology in education has been applied extensively around the globe over the last few decades. Modern Tech solutions have been integrated into areas of education service delivery and there is a consensus that the use of technology can make education more efficient, effective and equitable in countries all over the world (Coflan & Kaye, 2020) This aligns with the Sustainable Development Agenda (SDA) goals for 2030 (UNDP, 2022).

The use of technology in education is one of the most effective ways of enhancing learning among children with disabilities and addressing gender inequality to accessible education. According to Hasselbring and Glaser (102) computer-based technologies can play a very important role in the learning process; with adaptive and assistive technologies children with severe disabilities can participate fully alongside their peers who do not have disabilities. Through sophisticated computerized devices, children with disabilities overcome a wide range of limitations including hearing, vision and speech impairments, and physical disabilities (102).

Digital literacy is important in the use of digital devices in education for learners with disabilities. The Government of Kenya is committed to providing quality education for all as per the SDG 4 as per UNESCO 2021 targets; Convention on the Rights of persons with disabilities 2006 (UN, 2022). However, the gender gap in digital literacy is widening as technologies become more sophisticated (UNICEF, 2020). Distinct social, geographic and economic gaps in access persist, including those related to disability and gender (UNICEF, 2018; UNESCO, 2019). The Sustainable Development Goals (SDGs) have equality and inclusion at their core and they, therefore, provide a framework for the empowerment and full participation of women with disabilities (UN Women, 2018). Girls and women often have less access to technology and the internet, compared to boys and men, particularly in developing countries (PLAN International, 2022). In addition, PLAN International reports that stereotypes around technology being 'for boys' and fear of being discriminated against, stop girls from using digital technologies. Teachers need to be well equipped with the necessary digital skills. Lack of digital skills on the part of teachers can hinder the adoption of digital technology in the classroom (ILO, 2021).

Context of the study

The Government of Kenya is implementing a Competency Based Curriculum (CBC) which emphasizes digital literacy. The Kenyan Competency Based Curriculum (KCBC) defines competency as 'the ability to apply appropriate knowledge and skills to successfully perform a function'. To develop competencies among students at the basic level of education therefore, the KCBC focuses on the development of competencies including digital literacy, communication and collaboration, critical thinking and problem solving, creativity and imagination, citizenship and learning to learn. The competencies are geared towards helping learners to become engaged, empowered, and ethical citizens, and to thrive in a fast-paced 21st century world. Competencybased education approaches bring about meaningful connections between the learning areas and the competencies to be developed. However, the focus is not only on the development and acquisition of competencies and skills but also on the ability of learners to apply them in real-life situations.

The use of digital technology in education is one of the most effective ways of reducing barriers to quality education for all children and particularly those with disabilities. Globally, there has been inequality in access to digital literacy and there is a major gender gap where girls often have

less access to technology. In Kenya, the Competency-Based Curriculum puts a lot of emphasis on digital literacy. The Kenyan Government has also rolled out the Digital Literacy Program in partnership with UNICEF. The Ministry of Education, eKitabu and the Kenya Institute of Curriculum Development (KICD) piloted an accessible digital book (with audio, narration, sign language video and simplified text) to remove barriers for children with disabilities (UNICEF, 2020). Although digital literacy is considered one of the main core competencies for learning and life in the 21st century (KICD:25), the literacy program rolled out in the 507 public primary schools in Kilifi County, and its implementation has been slow. Despite the various initiatives, a range of challenges are present including inadequate infrastructure, limited electricity and internet connectivity, lack of training and continuous development opportunities, funding shortfalls and delays in disbursement, all negatively impacting the operation of programs (ILO, 2021).

1.2 Definition of Key Terminologies

Adaptive behaviour skills – These are skills and behaviours that make it possible for a person to get along in their environment and successfully meet the challenges of life. In this study, the skills included social, self-care, communication, occupational, and academic skills.

Assistive technologies – Any device, equipment or software used to bolster or maintain the functional capabilities of people with disabilities; they improve independence to facilitate participation, and to enhance overall well-being.

Control School- Refers to a school that was part of the project and which was used to compare the effects of using tablets as an intervention in enhancing digital literacy.

Digital devices - Electronic tools, systems, assistive devices and resources used to generate, store or process data.

Digital literacy - Refers to the ability to understand, use, access, create information and communicate using various digital technologies

Disability - A physical, mental, cognitive or developmental condition that impairs, interferes with, or limits a person's ability to engage in certain tasks or actions, or participate in typical daily activities and interactions

Experimental School- An **experimental school** refers to a school that was selected to participate in using tablets as an intervention in enhancing digital literacy.

Intellectual disability: A neuro-developmental condition characterized by limitations in cognitive functioning and skills, including communication, social and self- care skills. These limitations can cause a child to develop and learn more slowly or differently than a typically developing child.

Pilot School- A pilot school is one that participated in the preliminary phase of the project to help evaluate feasibility and effectiveness before full-scale implementation of the main project.

Special school - A special school is an educational institution specifically designed to meet the needs of children with a range of special educational needs (SEN) or disabilities. These schools provide tailored support and a curriculum that is adapted to the individual needs of the students.

Special Unit - A "unit" or "classroom" where children with disabilities are specially taught and supported, but they are still part of the larger mainstream school.

1.3 Purpose of the Study

The purpose of the study was to examine the application of digital technologies in enhancement of learning experiences for girls with intellectual disabilities in Kilifi County, Kenya.

1.4 Research Questions

The project answered the following questions:

[1] Which assistive and digital technologies have girls with intellectual disabilities interacted with in their learning experiences?

[2] What was the digital knowledge level of girls in the use of assistive and digital technologies to enhance their learning experiences?

[3] What was the digital knowledge level of teachers on the use of assistive and digital technologies to enhance learning for girls with intellectual disabilities?

[4] To what extent does the use of digital technology enhance the acquisition of adaptive skills for girls with intellectual disabilities?

[5] What were the challenges in implementing the use of assistive and digital technologies in the teaching and learning experiences for girls with intellectual disabilities?

1.5 Null Hypotheses

Ho₁: Use of digital content during learning does not significantly enhance the mastery of self- care skills for the girls with intellectual disabilities

Ho₂: Use of digital content during learning does not significantly enhance the mastery of communication skills for the girls with intellectual disabilities.

Ho₃: Use of digital content during learning does not significantly enhance the mastery of social skills for the girls with intellectual disabilities.

Ho4: Use of digital content during learning does not significantly enhance the mastery of occupational skills for the girls with intellectual disabilities

Ho₅: Use of digital content during learning does not significantly enhance the mastery of academic

skills for the girls with intellectual disabilities.

2.1 Study Design

The project applied an experimental design with pre-test and post-test using control and experimental groups/ schools.

2.2 Study Location

The study was conducted in Kenya, East Africa. Kenya has 47 Counties, Kilifi being one of them. Kilifi County is located in the Coastal region of Kenya. It has seven sub- counties namely: Kilifi South, Kilifi North, Malindi, Ganze, Magarini, Kaloleni and Rabai. There are eight special schools and 52 special units within the seven sub-counties.

2.3 Population and Sampling Procedures

The target population for the main study consisted of 1,247 girls with disabilities (709 from the 8 special Schools and 538 from the 52 special units in Kilifi County) and 198 class teachers. This study targeted girls with intellectual disabilities. Out of the 8 special schools, 3 schools did not have learners with intellectual disabilities and therefore only 5 participated in the study. Using stratified, random and purposive sampling techniques, 26 schools were selected comprising 21 special units and 5 special schools for learners with intellectual disabilities and 26 class teachers from the 26 schools. Among the 26 selected schools, 13 schools (10 special units and three special schools) were randomly selected to the control group, and 13 schools (11 special units and two special schools) were in the experimental group.

The intervention of the study was to provide tablets with digital content to test the improvement of digital literacy among girls with intellectual disability. At proposal writing, the research team had done a scooping study which indicated low availability of digital devices. The study was conceptualized on this background/assumption. The CODE project only availed one tablet in the 13 experimental schools. This one tablet was used by the 4 girls sampled in each school. However, being a special school; setting the tablet mainly served all the girls in the class.

2.4 Study Variables

The independent variable for the study was the application of digital technologies that was operationalized by the following indicators: access and use of digital technologies, and digital knowledge level of teachers and girls with intellectual disabilities. The dependent variable was enhancement of learning experiences for girls with intellectual disabilities. This was measured by checking the improvement in the following behaviour skills: self-care, communication, social skills, academic and occupational skills for the girls.

2.5 Research instruments

Qualitative and quantitative data was collected from 21 special units and 5 special schools. Data was collected using:

[1] Simplified interview schedule for girls with intellectual disabilities,

[2] Questionnaires for class teachers

[3] Observation Schedule

[4] Adaptive Behaviour Skills Checklist to determine the change in self-care skills, social skills, communication skills, academic skills and occupational skills.

[5] Focus Group Discussion for teachers from the experimental schools

2.6 Piloting

Piloting was done to determine whether the research tools would yield valid and adequate data to address the research questions. The tools were tested to check their content validity, wording, form, layout and relevance.

The pilot study was done in two schools (Sahajanand Special Unit and Gede Special School in Kilifi County) which did not participate in the main study. The two schools were a reflection of the representativeness expected in the actual study. The researchers were supposed to interact with 4 girls with intellectual disabilities in each special school/unit, the head teacher and the class teacher of the selected girls in each school. However, in one of the special schools, there were only two girls with intellectual disabilities. That meant 6 girls; two head teachers and two class teachers took part in the pilot study. The two schools used for piloting were excluded from participating in the actual /final study.

One tablet enabled with digital content on self-care, social, communication, academic and occupational skills were provided to each of the two pilot schools. One day training was given to the teachers involved in piloting to empower them on how to use the digital content in the tablet to teach girls with disabilities. The content for the training included [1] pedagogical skills for special needs education, and [2] how to use the digital technology to access digital content loaded on tablets. It is worth noting that the two tablets used during piloting were among the 13 that were budgeted for but they were not left in the schools after piloting was over.

A monitoring tool was used by the researchers to assess the adherence to the use of tablets by teachers who had been trained. This was done two weeks after the schools received the tablets to ensure that teachers and the selected girls consistently interacted with the digital devices.

2.7 Data Collection

Data was collected using simplified interview schedules for girls with intellectual disabilities, questionnaires for class teachers, observation schedules, Adaptive Behaviour Skills Checklist and a Focus Group Discussion with sampled class teachers.

A pre-test and post-test were done to determine the change in adaptive skills of the girls During the pre-test, most teachers reported not having been trained on how to provide digital support to learners with Intellectual disabilities. It was noted that 2 had extensive skills and were serving as tech champions in their schools. However, they still needed training due to the very specific nature

of the software applications and the content added on the tablet. All teachers in experimental schools were taken through one day training. After 2 weeks of use, a monitoring session was conducted to assess usability. The difference in skill level among teachers did not pose a challenge since the apps are designed for simplicity and are self-guiding.



Inception meeting with head teachers and teachers from sampled special schools with in Kiifi County



Typical classroom environment in special schools Girls with Intellectual Disability interacting with the tablet





Participants during the FGD Sessions

2.8 Data Analysis

Data was analyzed using SPSS to generate frequency tables to represent emerging trends, and the non-parametric Wilcoxon signed—rank test for related pair samples to test whether the adaptive skills of girls differed significantly between the pre-and post-tests, and between the control and experimental groups. Qualitative data was summarized into themes and analyzed to generate thematic patterns and triangulated the quantitative data collected.

2.9 Ethical Considerations

Research permissions were sought from the National Commission for Science, Technology and Innovation (NACOSTI), the Pwani University Ethics Review Committee and the Ministry of Education (MoE). Informed consent was sought from the head teachers, class teachers and the girls before the project began. The school administration was informed of the intended research and gave consent for the girls to be interviewed. All participants were briefed on the purpose of the project; none declined to participate. The privacy and confidentiality of the participants was guaranteed by not including the respondents' names in the report. The researchers were cognizant of the fact that the respondents in the study were vulnerable children; therefore, measures were taken to ensure that there was no child abuse or violation of their rights during data collection from girls with intellectual disabilities.

3.0 Results

The data was collected from 104 girls with mild intellectual disabilities and 26 class teachers. Data was entered and analyzed on SPSS and Excel spreadsheets. Data was presented using frequency tables and graphs; tests of significance were also run using non-parametric Wilcoxon signed-rank test for related paired samples. Findings are presented under the following sub-titles to address the study's research questions: availability of digital technologies for girls; digital knowledge level of girls in the use of assistive and digital technologies to enhance their learning experiences; digital knowledge level of teachers on the use of assistive and digital technologies to enhance the acquisition

of adaptive skills for girls; and challenges in implementing the use of digital technologies in the teaching and learning for girls with intellectual disabilities.

3.1 Digital technologies available to girls with intellectual disabilities

Teachers in the 26 schools were asked about the availability of digital technologies in their schools, the number available and the number of those that were functional. Table 1 shows the total number of digital devices available and the average number per school. As shown, on average there were 2 computers, 2 laptops, and 27 tablets per school. There were no graphic organizers, nor were sip and puff systems available. The study also found that there were 17 smart phones available (13 out of 26 Schools), and that these phones were personal property of teachers who were using them to support teaching and learning.

Device	Number available in	Average number of
	schools	devices per schools
Computers	52	2
Laptops	40	2
Tablets	708	27
Graphic organizer	0	0
Sip and Puff system	0	0
Smart Phones	17	< 1

Table 1: Number of digital devices available in schools

The Policy on Information and Communication Technology in Education and Training (MOE, 2021) recommends the use of digital technology to enhance learning. However, as indicated in Figure 1 below, the study found that out of the 26 schools, 22 had no computers at all, 15 had no laptops, and 13 had no tablets. Although some schools had tablets and computers, it was noted from FGD discussions that priority to access and use was given to the regular learners since the devices did not have content linked to the special education curriculum.



Figure 1: Number of Digital Devices available in Schools

As summarized in Figure 2, the study found that 15.4% of schools had computers and these computers were functional in 15.3% of the schools. In relation to laptops, 50% of schools had them but they were functional in only 39% of the schools. Tablets were available in 42% of the schools but were only functional in 40% of the schools. It was also found that smart phones were available in 54% of the schools and 50% of them were functional. During classroom observations, it was confirmed that most of the computers and tablets that the Ministry of Education provided were faulty. The main complaints raised about the tablets were that the powering buttons were not functional and charging systems had failed. Figure 2 further shows that smart phones were available in 54% of schools. It was however explained that the smart phones were teachers' personal property but were used due to lack of devices in the schools. It was also found that there were no graphic organizers, or sip and puff systems in the schools.



Figure 2: Percentage of schools with available and functional digital technologies

3.1.1 Assistive technologies available to girls with intellectual disabilities

There were no assistive technologies available for girls with mild intellectual disabilities. This is an impediment to learning. From the FGD discussion, teachers noted that girls with intellectual disability require intellectually stimulating assistive tools like text to speech, speech to text, reminder apps, task management tools, communication boards and graphic organizers.

3.2 Digital knowledge of girls in the use of digital technologies

The learners were asked whether they sometimes use a mobile phone, the results are indicated in Table 2 below. 52.4% mentioned that they sometimes used a mobile phone while 44.7% had no access to phones at all. 2.9% of the girls had no idea about the use of the mobile phone. The girls reported that sometimes teachers allowed them to use their phones to talk to their parents and guardians. However, their digital skills remain low since they are not allowed to manipulate the phones for fear of mishandling.

	I so	ometimes us	e a mobile	e phone	
				Valid	Cumulative
		Frequency	Percent	Percent	Percent
Valid	Yes	54	51.9	52.4	52.4
	No	46	44.2	44.7	97.1
	No Idea	3	2.9	2.9	100.0
	Total	103	99.0	100.0	
Missing	System	1	1.0		
Total		104	100.0		

Table 2: Use of Mobile Phone

Figure 3 below shows that 22.1% of the learners responded yes to the question on whether they had ever used a computer, laptop or tablet; 75% had never interacted with these devices and 2.9% of the girls had no idea of the devices.



Figure 3: Percentage of girls who have ever used a computer/laptop/ tablet

Figure 4 below indicates that 66.7% of the teachers sometimes use a computer or laptop to teach the girls while 33.3 % do not use them. The study found that the Ministry of Education had made an effort to supply laptops in schools, Ministry of Education (MoE, 2021). However, the tablets were mainly used in the regular classes and not in the special education class because the content loaded was unsuitable for learners with intellectual disability.



Figure 4: My teacher sometimes uses a computer to teach

3.3 Digital knowledge of teachers on the use of digital technologies

The teachers were asked whether they had any training on the use of digital technologies to support learning for children with intellectual disabilities. Figure 5 indicates that only 3.8% of the teachers had undergone training in digital technology to a large extent, 50% said they had undergone training to a small extent and 46.2% of the teachers said that they had never been trained. The 3.8% of the teachers who had undergone training in digital technology to a large extent were expected to cascade their skills to the other teachers which was not practical due to lack of resources and heavy teaching workload.





Teachers reported having limited digital skills, they reported that the computer training they had during their pre-service training were basic computer skills, which are inadequate in comparison to the skills they need to cater for the needs of children with special needs.

3.4 Effect of use of digital technology in enhancing acquisition of adaptive skills

The study sought to determine whether the use of digital technology could enhance skill acquisition for girls with intellectual disabilities. Experimentation was done by availing digital content on a tablet (the content was at an appropriate level for intellectual disabilities and was in the form of instructional videos, songs, dances and cartoons) and aimed at enhancing the following skills in the learners: self-care skills, communication skills, social skills, academic skills, and occupational skills. Each skill was presented separately showing first, the percentages of learners who could perform the task all the time on their own. The graphs further present prevalence levels before experimentation (pretest) and after experimentation (posttest). A composite figure for each

of the adaptive skills was computed by summing up the five individual tasks on the Adaptive Behaviour Skills Checklist (See Appendix 1). Null hypotheses for the study state that introduction of digital content in teaching and learning has no effect on skill acquisition among girls with intellectual disabilities. Wilcoxon Signed Ranks tests were used to determine the difference in scores between the pre and post test data. The indices were compared to alpha of .05 to judge whether to reject or retain the study hypotheses.

a. Mastery of Self-Care Skills

Mastery of self-care skills was computed by adding up five indicators of self-care (See Appendix 1). Findings from the analysis of self-care are presented in Figure 6. The figure shows that generally post-test results on mastery of self-care skills were higher than pretest findings. In the pretest, 54.9% of the learners were able to perform personal grooming independently, this increased to 68.3% after the girls interacted with the digital content provided. Similarly, improvement is noted in knowledge of public signs, telling time, observing safety precautions, and using personal items properly.



Figure 6: Mastery of Self Care Skills

The following null hypothesis was tested:

Ho1: Use of digital content during learning does not significantly enhance the mastery of selfcare skills for the girls with intellectual disabilities.

A Wilcoxon Signed Rank test was run to determine whether the difference in scores was significant. Findings in Table 3 and Table 4 show that there is a significant difference (Z = -3.396, p < .05) between responses on mastery of self-care skills in the pretest and those in the post test. The scores appear to improve from pre-test to post-test, which can be inferred from the negative Z

score. Consequently, the null hypothesis is rejected and it is concluded that use of digital content significantly enhanced the mastery of self-care skills for the girls.

	Ranks			
		Ν	Mean	Sum of
			Rank	Ranks
	Negative Ranks	16ª	26.31	421.00
Self-care mastery post –	Positive Ranks	42 ^b	30.71	1290.00
Self-care mastery_pre	Ties	31°		
	Total	89		

Table 3: Self Care Skills Descriptive

Table 4: Self Care Skills Significance Test

Test St	tatistics ^a
	Selfcare mastery_post –
	selfcare mastery_pre
Z	-3.396 ^b
Asymp. Sig. (2-tailed)	.001

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

b. Mastery of Communication Skills

The study sought to know about the communication skills of students. It was found out that in the pretest before the digital content was introduced to learners, 49% of them could communicate their needs and desires to others, and this improved to 58.8% in the post-test. Improvement was also noted for turn taking, delivering messages, making decisions and choices, and following oral directions.





Figure 7: Mastery of Communication Skills

To check for improvement in communication skills, the study tested the null hypothesis that:

Ho₂: Use of digital content during learning does not significantly enhance the mastery of communication skills for the girls with intellectual disabilities.

The change in communication skills between pretest and posttest (Table 5 and 6) was found to be significant, (Z = -3.210, p < .05). The scores appear to improve from pre-test to post-test, which can be inferred from the negative Z score. The null hypothesis was rejected leading to the conclusion that exposing learners to the digital content loaded on the CODE tablets resulted in a significant improvement in the communication skills of the learners.

Table 5: Communication	Skills	Descri	ptive
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	Ranks			
		Ν	Mean Rank	Sum of Ranks
	Negative Ranks	16ª	31.38	502.00
Comm mastery post –	Positive Ranks	45 ^b	30.87	1389.00
Comm mastery_pre	Ties	35°		
	Total	96		

Table 6: Communication Skills Significance Test

Test Sta	tistics ^a
	Comm mastery_post
	 Comm mastery_pre
Z	-3.210 ^b
Asymp. Sig. (2-tailed)	.001
a. Wilcoxon Signed Rank	ks Test

b. Based on negative ranks.

c. Mastery of Social Skills

A pre-post procedure was further applied on mastery of social skills by the students. It was found that all the five social skills selected for exploration improved. The ability to maintain friendships improved from 37.3% to 50%, as shown in Figure 8. Improvement is also shown in the ability to use social phrases, to follow classroom rules, to interact with others, and to work without disrupting others.

Mastery of social skills



Figure 8: Mastery of Social Skills

To check for improvement in social skills, the study tested the null hypothesis that:

Ho3: Use of digital content during learning does not significantly enhance the mastery of social skills for girls with intellectual disabilities.

An analysis of change between pretest and posttest for social skills was found to be significant, (Z = -2.754, p < .05) as indicated in Tables 7 and 8. The scores appear to improve from pre-test to post-test, which can be inferred from the negative Z score. The null hypothesis was rejected leading to the conclusion that when learners used digital content loaded on the tablets, there was a significant improvement in their social skills.

	Ranks			
		Ν	Mean Rank	Sum of Ranks
	Negative Ranks	19 ^a	25.42	483.00
Social mastery post –	Positive Ranks	38 ^b	30.79	1170.00
Social mastery_pre	Ties	33°		
	Total	90		

Table 7: Social Skills Descriptive

Table 8: Social Skills Significance Test

Test Sta	atistics ^a
	Social mastery_post –
	Social mastery_pre
Z	-2.754 ^b
Asymp. Sig. (2-tailed)	.006
a. Wilcoxon Signed Ran	ks Test

b. Based on negative ranks.

d. Mastery of Academic Skills

To check for improvement in academic skills, the study tested the null hypothesis that:

Ho4: Use of digital content during learning does not significantly enhance the mastery of academic skills for girls with intellectual disabilities.

After learners were exposed to digital content during learning, findings of this study show that there was a slight improvement in their academic skills. As shown in Figure 9, the percentage of learners who could read simple sight words changed from 30.4% to 32.4%. Those who could perform basic mathematics tasks, simple reading tasks and those who could recognize numbers also increased slightly. However, those who could follow guided directions reduced from 38.2% to 35.6%.

A Wilcoxon Signed Rank test was run to determine whether the difference in scores between the pre and post-tests was significant and it was found that difference was not significant (Z = -.986, p > .05) as shown in Tables 9 and 10. The scores appear to improve from pre-test to post-test, which can be inferred from the negative Z score, however, the null hypothesis is retained and it is concluded that the use of digital content enhanced the mastery of academic skills for the girls, though not significantly.



Mastery of Academic Skills

Figure 9: Mastery of Academic Skills

Table 9: Academic Skills Descriptive

	Ranks			
		Ν	Mean Rank	Sum of Ranks
	Negative Ranks	25ª	34.60	865.00
Academic mastery post –	Positive Ranks	38 ^b	30.29	1151.00
Academic mastery_pre	Ties	31°		
	Total	94		

Table 10: Academic Skills Significance Test

	Academic mastery_post –
	Academic mastery_pre
Z	986 ^b
Asymp. Sig. (2-tailed)	.324

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

e. Mastery of Occupational Skills

To check for improvement in social skills, the study tested the null hypothesis that:

Ho5: Use of digital content during learning does not significantly enhance the mastery of occupational skills for girls with intellectual disabilities.

Findings on occupational skills show that there was an improvement in occupational skills of learners. As shown in Figure 10, 51% of the learners kept good time to arrive in class, which was higher than 48% from the pretest. Similarly, analysis was done on other indicators including: maintaining attention, performing work with little supervision, persistence on tasks and being able to handle simple purchases. All the indicators showed an improvement.

An analysis of change between pretest and posttest for occupational skills, shown in Table 11 and 12, was found to be significant, (Z = -1.998, p < .05). The scores appear to improve from pre-test to post-test, which can be inferred from the negative Z score, as shown in Table 12. The null hypothesis was rejected implying that when learners used digital content, there was a significant improvement in their occasional skills.



Figure 10: Mastery of Occupational Skills

Table 11:	Occupational	Skills	Descriptive
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	Ranks			
		Ν	Mean Rank	Sum of Ranks
	Negative Ranks	26ª	32.65	849.00
Occup mastery post –	Positive Ranks	42 ^b	35.64	1497.00
Occup mastery_pre	Ties	27 ^c		
	Total	95		

Table 12: Occupational Skills Significance test

Test Statistics ^a					
	Occup mastery_post –				
	Occup mastery_pre				
Z	-1.998 ^b				
Asymp. Sig. (2-tailed)	.046				
a. Wilcoxon Signed Ranks	Test				

a. Wilcoxon Signed Ranks Te

b. Based on negative ranks.

3.5 Challenges in implementing the use of digital technologies in the teaching and learning

This section addressed objective 5 on challenges in implementing the use of assistive and digital technologies in the teaching and learning. The instruments for collecting data included focus group discussion (Appendix 5), teachers' questionnaires (Appendix 3) and observation Schedule (Appendix 4)



Figure 11: Challenges in implementing the use of assistive and digital technologies in the teaching and learning

The study found out that in 11 out 13 (84.6%) of the experimental schools lacked digital technologies while 38.5% (in 5 out of the 13 schools), teachers lacked sufficient training on the use of digital technologies. It was also found that 2 schools (15%) did not have power connectivity.

The study found that the few digital devices available in schools were not useful to girls with intellectual disabilities due to their intellectual limitations. The content loaded in the devices from the Ministry of Education did not have the relevant content for girls with intellectual disabilities. The devices are protected in a way that relevant programs could not be loaded by the teachers. Teachers indicated poor internet connectivity and lack of funds to purchase digital devices by the schools.

The study identified several challenges encountered while using the tablets, including instances where some content was accidentally erased by learners during handling. Although the study targeted four girls with intellectual disabilities, other learners in the class were eager to interact with the tablets, which caused disruptions. Additionally, other class members, particularly boys, felt excluded and overlooked, as they were not included in the study.

Despite the above-mentioned challenges, there were some positive changes that were noted among the girls which included reduced absenteeism, improvement in self-esteem, self-confidence, grooming, concentration in class, following routines and sharing and the girls became more interested in using the tablet. Teachers were motivated and interested in using the tablets, teaching preparations and delivering content improved and saved time by using the tablet.

4.0 Discussion

Kenya's Policy on Information and Communication Technology in Education and Training (MOE, 2021) recommends using digital technology to enhance learning. However, this study found very low availability of digital technologies. The study also found that the Ministry of Education had made an effort to supply laptops in schools (MoE, 2021). However, the tablets were mainly used in regular classes and not in the special education class because the content loaded was unsuitable for learners with intellectual disability. Out of the 26 schools, 22 had no computers at all, 15 had no laptops, and 13 had no tablets. This study, therefore, is in agreement with Omboto's (2022) position that the government should provide adequate digital resources to all public primary special schools in Kenya and ensure a stable power supply.

The study also found that there were no assistive technologies available for girls with mild intellectual disabilities. From the FGD discussion, teachers noted that girls with intellectual disability require intellectually stimulating assistive tools. A study by Kanga and Omboto (2022) revealed that a lack of assistive and digital technologies can be a serious impediment to learning in schools, especially in developing countries like Kenya. This is in agreement with the current study findings.

The Ministry of Education recommends capacity building in the use of technology for special education teachers to enhance their skills in supporting learners with disability (MoE, 2018). The current study found that 46.2% of the teachers had never been trained on the use of digital technologies to support girls with intellectual disabilities, while 50% had undergone training to a small extent. The teachers reported that the computer training they had during their pre-service training was basic computer skills, which was inadequate for the skills they needed to cater for the needs of children with special needs. The finding agrees with those of Omboto (2022: v) who revealed that teachers in public primary special schools and special units in Nairobi County were not adequately prepared to implement the digital literacy program (DLP) as expected. Furthermore, the lack of basic infrastructure such as connection to a stable power supply and inadequate digital devices contributed to teachers' inadequacy.

According to Wallace and Georgina (2014), teachers' learning about and using educational technology has a statistically significant and positive impact on their teaching, and further, it enhances student engagement. Specifically, proficiency with Smart board and Movie Maker software was positively impacted by the knowledge and skills that teachers developed during prior

training. Wallace and Georgina (2014) further add that effective technology integration happens across the curriculum in ways that deepen and enhance the learning process. In particular, technology integration must support four key components of learning: active engagement, participation in groups, frequent interaction and feedback, and connection to content and realworld experts. Indeed, the limited digital skills reported by teachers in the current study reduce opportunities for active engagement with learners. The current study further points out that the unavailability and inadequacy of digital devices in special schools and units made it difficult to precisely determine the teacher's preparedness to implement digital literacy programs for children with disabilities.

The study tested the null hypotheses that the use of digital content in teaching and learning does not affect skill acquisition among girls with intellectual disabilities. Post-test results on mastery of five key skills were higher than pretest findings. Statistically significant improvement was noted in four out of the five skills: In self-care skills (such as knowledge of public signs, telling time, observing safety precautions, and using personal items properly), mastery of communication skills (turn-taking, delivering messages, and making decisions and choices), and on social skills such as following classroom rules and interacting with others. Significant improvement was also noted in occupational skills which included maintaining attention, performing work with little supervision, and persistence on tasks. Finally, although there was improvement in academic skills (such as performing basic mathematics tasks and simple reading tasks), the change was not statistically significant. Learners with mild intellectual disability may face challenges in understanding simple mathematical concepts (Prabavathy and Sivaranjani, 2021).

According to Khasawneh (2024), students who utilize digital learning methods demonstrate enhanced learning speed and increased innovation. They exhibit improved arithmetic skills and actively engage in various computer-based activities such as completing schoolwork, playing games, and communicating with friends through social networks. Multimedia-based digital learning tools facilitate enjoyable lessons and games, thereby aiding students in their learning process. Khasawneh found that using digital audio-visual stimuli provided learners with ample opportunities to repeat activities, identify errors and rectify them, thereby enhancing their educational attainment. He also found that engaging in diverse and stimulating activities that offer ongoing feedback enhanced the retention of knowledge in students' minds. The present study acknowledges these findings as the girls with mild intellectual disabilities reportedly enjoyed the variety of activities presented to them as they sang along, reacted positively to the content, and showed improved performance.

The study found that the few digital devices available in schools were not useful to girls with intellectual disabilities due to their intellectual limitations. The content loaded in the devices from the Ministry of Education did not have relevant content for girls with intellectual disabilities. Teachers indicated poor internet connectivity and a lack of funds to purchase digital devices in the schools. The study found out challenges that were encountered while using the tablets including some content that was erased by learners in the process of handling the tablet. Despite the abovementioned challenges, some positive changes were noted among the girls which included reduced absenteeism, self-esteem was boosted, improvement in self-confidence, grooming, concentration in class, following routines and sharing and the girls became more interested in using the tablet

5.0 Relevance and Value of the Research

Research findings from this study guides stakeholders in the education sector in Kilifi County to identify the gaps that need to be filled to ensure digital literacy is implemented, to advance education for girls with intellectual disabilities in the county. This could lead to the provision of digital and assistive technologies in special schools and units, alongside the professional development of educators in the effective application of digital technologies to improve learning outcomes for girls with intellectual disabilities.

Such provisions enhance quality education for girls with intellectual disabilities in Kilifi County and the achievement of the Sustainable Development Goal (SDG) 4, for equitable quality education for all. The study findings inform the county and national education policymakers the need to come up with better strategies for planning and implementing digital literacy in special schools and units. Consequently, these strategies aim to improve the lives of girls with intellectual disabilities and mitigate their functional limitations by enhancing their ability to engage in and participate in typical daily activities and interactions

The study provides up-to-date and authoritative statistics on the availability of digital facilities, training needs and challenges faced by schools for children with disabilities in Kilifi County. Based on the findings and recommendations of the study listed below, schools that support learners with intellectual disabilities have justification for sourcing digital learning and training technologies.

Improved digital literacy among girls with intellectual disabilities promotes the quality of education by allowing collaboration, creativity, communication, and critical thinking. Furthermore, and very importantly, digital literacy will enhance the use of technology and interaction with the world around them, leading to a more inclusive community.

6.0 Conclusion

The conclusion reached was that the CODE Project of providing tablets for use by learners with Intellectual Disability was impactful. After the training and use of the tablet provided in this project, there was significant improvement in the digital knowledge level for teachers in experimental schools. After interacting with the tablets, there was an improvement in the digital knowledge level and acquisition of adaptive skills for girls with intellectual disability.

7.0 Recommendations

- 1. The Ministry of Education should conduct a needs analysis to ensure adequacy in the provision of tablets and projectors to Special Schools and Special Units.
- 2. The Ministry of Education should provide assistive and digital devices to cater for all learners with intellectual disabilities.
- 3. The Ministry of Education should continuously build the capacity of special teachers to keep them abreast with current digital and assistive technologies.

- 4. The Ministry of Education should ensure that all schools have internet connectivity.
- 5. Kenya Institute for Curriculum Development (KICD) should develop digital content suitable for learners with intellectual disabilities at the foundational, intermediate, prevocational and vocational levels.

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8.0 Appendices

APPENDIX 1: ADAPTIVE BEHAVIOUR SKILLS CHECKLIST FOR LEARNERS

ADAPTIVE BEHAVIOUR SKILLS CHECKLIST

Date	
Student No	
Age	Sex
School code	Sub- County

Instruction: To be filled by Class teachers

Teacher Initials.....

Adaptive behavior is a developmentally determined set of coping skills. Deficits in adaptive behavior are defined as significant limitations in an individual's effectiveness in meeting the standards of maturation, learning, personal independence, social responsibility, and school performance that is expected of the individual's age level and cultural group.

Please rate the items on this checklist according to how often the student performs the task by placing a **Tick ([])** in the appropriate box.

Self-Care Skills	Never	Sometimes	Always
1. Performs personal grooming and hygiene tasks independently.			
2. Knows the meaning of signs that appear in public (e.g washrooms, Exit, Stop) and land marks (e.g flag-post, gate, toilet)			
3. Tells time using traditional or digital watch or clock/ relate time to daily activities			
4. Observes safety precautions.			
5. Demonstrates proper use of personal items.			
Communication Skills			
1. Communicates needs and desires to others using appropriate methods.eg			
talking, drawing, body language, writing.			
2. Takes turns talking during conversation.			
3. Can deliver messages dependably.			
4. Can make simple decisions and choices.			
5. Can follow oral directions given.			
Social Skills			
1. Establishes and maintains friendships.			
2. Uses social phrases appropriately (e.g. please, hello, sorry, thank you)			
3. Follows classroom rules.			
4. Interacts without displaying negative physical or verbal behaviors.			

1=Never 2=Sometimes 3=Always

5. Does own work without disrupting others.	
Academic Skills	
1. Read some pictures or simple sight words.	
2. Follows guided directions to underline, draw a circle, draw an X.	
3. Performs beginning math tasks(e.g rote counting/ counting/ simple addition and subtraction)	
 Performs beginning reading tasks (e.g. identifying some letters of the alphabet/ reads simple words or sentences). 	
5. Can recognize numbers or meaning of math symbols (e.g., $+$, $-$, x, $=$).	
Occupational Skills	
1. Arrives in class on time.	
2. Maintains attention and effort in a given activity.	
3. Performs work with little or no supervision.	
4. Continues working until assigned tasks are complete	
5. Can handles some little money and make simple purchases.	

THANK YOU FOR YOUR COOPERATION

Appendix 2

SIMPLIFIED INTERVIEW SCHEDULE FOR GIRLS WITH INTELLECTUAL DISABILITY

Date.....

 Student No.
 Age.
 Sex.

 School Code.
 Sub- County.

 1. Does your teacher sometimes use a mobile phone to teach you? (show a mobile phone)

 • Yes

 • No

 • No idea

- 2. Does your teacher sometimes use a computer to teach you? (show a computer/ laptop)
 - Yes
 - No
 - No idea
- 3. Does your teacher show you cartoons or games when teaching? (show a short video on phone)
 - Yes
 - No
 - No idea
- 4. Do you use a mobile phone sometimes? (show a mobile phone)
 - Yes
 - No
 - No Idea
- 5. Have you ever used a computer/ laptop? (show a computer/ laptop)
 - Yes
 - No
 - No Idea
- 6. Have you ever watched games in a mobile phone or computer/laptop? (show cartoons/game on phone)
 - Yes
 - No
 - No idea
- 7. Have you ever watched cartoons in a mobile phone or computer/ laptop? (show cartoons/ game on phone)
 - Yes
 - No
 - No idea
- 8. Did you enjoy watching the cartoons and games?
 - Yes
 - No
 - No idea
- 9. Would you like your teacher to be using a computer or mobile phone when teaching?
 - Yes
 - No
 - No idea

THANK YOU FOR YOUR COOPERATION

Appendix 3

CODE Survey Questionnaire for Class Teachers

Interview Data (to be filled in by enumerator)

Date (DD/MM/YYYY):		/		/			Respondent No.:
RA Initials:							

School Code:

Statement of Consent and Agreement

The purpose of this study is to explore the application of digital and assistive technologies in enhancement of learning experiences for girls with disabilities in Kilifi County. Specifically the study, being conducted by a team of researchers from Pwani University School of education, will find out about the knowledge level of girls and their teachers in the use of assistive and digital technologies to enhance their learning experiences; and the extent to which the use of digital technology enhances the acquisition of adaptive skills for the girls. The project will apply an experimental design with pre-test and post-test approach.

You have been selected to take part in the pre-testing phase of this study. This phase will involve manipulating the learning environment by providing opportunities for interaction with digital content to gain insights into how girls with intellectual disabilities learn, and to identify what works. You will complete a questionnaire at the beginning of the study and you will be trained on how to use this digital content to enhance learning for the girls. You will then work with tablets provided to the learners over a period of 3 months. The tablets which are enabled with digital content on social skills, communication, and self-dependence will be made available to the selected learners.

The study will conclude with a post-test to check progress in learning for the girls and a questionnaire for the teacher to gain more insight in the learning and teaching experiences. After the study, the tablets assigned to your school will be handed over to the school to benefit and enrich the learning experiences for all the students.

It is anticipated that the research findings from this study will guide the Kilifi County education stakeholders to identify the gaps that need to be filled to ensure digital literacy is implemented, and to advance education for girls with intellectual disabilities in the county. This may result in the provision of digital and assistive technologies in special schools and special units, and the retooling of teachers in these schools. Such provisions will contribute to quality education for girls with intellectual disabilities in Kilifi County.

Your participation in this project is completely voluntary. If at any point you decide to stop or withdraw, you may do so. This project is being conducted in strict confidentiality and in

cognizance of the vulnerability of girls with disabilities. All information will be reported anonymously as only codes will be used in reporting.

Do you understand this statement and agree to participate in the survey?



By placing an "X" in the box, I certify that I read the statement of consent and that I agree to participate in the survey.

Thank you for agreeing to participate in this study. Your honest opinion is very important to us and will help us to foster learning for girls with disabilities.

SECTION 1: DEMOGRAPHIC INFORMATION

1. a. Please, indicate the type of school

- □ Special School
- □ Special Unit
- b. Ward
- c. Sub- County
 - \Box Kilifi North
 - 🗆 Kilifi Sout
 - 🗆 Magarini
 - 🗆 Malindi
- 🗆 Rabai
- □ Ganze

Kaloleni

- 2. Sex of respondent:
 - □ Male
 - □ Female
- 3. Age of respondents:

□ 18 - 19 years
□ 20 - 24 years
□ 25-29 years
\Box 30-34 years
\Box 35 years and above
4. Level of learners you are teaching
□ Intermediate
□ Pre-vocational
5. What type of teacher training do you have? Tick as many as may apply.
□ Diploma
□ Others, specify
6. a. Do you have training that is specific to special needs? Yes No
b. If YES, kindly specify the kind of training in special needs

SECTION 2: Access and use of assistive and digital technologies by girls

1. Which of the following *digital hardware technologies* are available in your school to support girls with intellectual disabilities?

	Digital technologies	Tick if Available	Number available	Number that are functional
1	Computer			
2	🗆 Laptop			
3	🗆 Tablet			
4	Graphic organizer			
5	□ Sip and puff systems			
6	Smart phones			

2. Which of the following *digital software technologies* are available in your school to support girls with intellectual disabilities?

	Digital technologies	Avai	lable	Number	Number that
		NO	YES	avallable	are functional
1	Text to speech software				
2	Talking spell checker				
3	Picture dictionary graphics				
4	Graphic organizer				
5	Sip and puff systems				
6	Screen readers				
7	Audio books				
8	Communication cards				
9	Interactive games				

3. Which specific *digital technologies* do girls with intellectual disabilities in your school interact with in their learning experiences to enhance:

a.	Self-care skills
b.	Communication skills
c.	Social skills
d.	Academic skills
e.	Occupational skills

4. How would you rate the knowledge level of girls in the use of *digital technologies* to enhance their learning experiences?

¹ Very low
² Low
³ Quite high

4 Very high

99 🛛 I don't know

5. To what extent does the use of *digital technology* enhance the acquisition of adaptive skills for girls with intellectual disabilities?

¹ very low	
2 🗌 low	
₃ high	

99 🛛 I don't know

6. Which *assistive technologies* do girls with intellectual disabilities in your school interact with in their learning experiences to specifically enhance their:

f.	Self-care skills
g.	Communication skills
h.	Social skills
i.	Academic skills
j.	Occupational skills

7. How would you rate the knowledge level of girls in the use of *assistive technologies* to enhance their learning experiences?

¹ Very low
² Low
³ Quite high
⁴ Very high

99 🛛 I don't know

8. To what extent does the use of *assistive technology* enhance the acquisition of adaptive skills for girls with intellectual disabilities?

very low
 low
 lhigh
 l don't know

SECTION 3: Digital knowledge level of teachers on the use of assistive and digital technologies

- **Q1** a. Have you had any training on use of digital technologies to support learning for children with intellectual disabilities?
 - 1 Never
 - ² Yes, to a small extent
 - $_{3}$ Yes, to a great extent

b. If yes, in which specific areas have you been trained?

.....

Q2 Have you ever used any of the following digital technologies to teach (in this school or elsewhere)?

S/N	Digital technologies	Yes/No	Y	Your competency level				
			Low	Average	High			
а	□ Text to speech software							
b	□ Talking spell checker							
c	□ Picture dictionary graphics							
d	Graphic organizer							
e	□ Sip and puff systems							
f	□ Screen readers							
g	Audio books							
h	Communication cards							
i	□ Interactive games							

3. What challenges do you experience in implementing the use of assistive and digital technologies for girls with intellectual disabilities?

.....

4. What recommendations can you make in relation to technology to enhance teaching and learning for girls with intellectual disabilities?

.....

.....

5. Is there anything else you would like to tell us today in relation to the use of assistive technologies to enhance learning for girls with disabilities?

.....

THANK YOU FOR YOUR COOPERATION

Appendix 4

OBSERVATION SCHEDULE FOR RESEARCHERS

A team of researchers from Pwani University in Kilifi County is conducting a study on the application of assistive and digital technologies in enhancement of learning experiences for girls with intellectual disabilities. The project is being conducted in strict confidentiality and in cognizance of the vulnerability of the girls. All information will be reported anonymously as only codes will be used in reporting.

Name of the school/ school code.....

Name of the sub county.....

Tick the type of school: Special unit Special school

1a). which assistive technologies are available in the classroom for girls with intellectual disabilities to interact with?

1b). which digital technologies are available in the classroom for girls with intellectual disabilities to interact with?

2a). Are there enough assistive technologies for girls with intellectual disabilities to interact with in the classroom?

2b). Are there enough digital technologies for girls with intellectual disabilities to interact with in the classroom?

3a). How are the available assistive technologies put to effective use to enhance acquisition of adaptive skills?

3b). How are the available digital technologies put to effective use to enhance acquisition of adaptive skills?

4a) Observe how girls with intellectual disabilities reacted when interacting with digital technologies. Do they enjoy? Do they find it difficult?

5). How is the classroom environment made conducive for the acquisition of adaptive skills for girls with intellectual disabilities?

6). How is the seating arrangement? is it conducive for acquisition of adaptive skills? Is there enough space to allow the learners' movement?

7). How many teachers do we have in a classroom during a lesson? Is there team teaching?

APPENDIX 5

Class teachers' FGD Questions for the 13 teachers from the experimental group.

FGD Data (to be filled in by enumerator)

Date (DD/MM/YYYY):	/		/			Respondent ID.:
RA initials School code						

Statement of Consent and Agreement

Hello, we are researchers from Pwani University. We are carrying out a survey to examine the digital and assistive technologies that can support learning of girls with disabilities.

The survey seeks to document the availability of digital and assistive technologies in schools, examine the assistive and digital technologies that girls with disabilities have interacted with, in their learning experiences, the knowledge level of teachers on the use of digital technology to enhance learning, challenges encountered in implementing digital literacy in the schools' supporting girls with disabilities? This survey will provide a rationale for continued digital support for children with special needs. Your participation in this focus group discussion is completely voluntary and is being conducted in strict confidentiality.

Do I have your consent to proceed with the focus group discussion?

Yes No

Thank you for agreeing to participate in this focus group discussion

SECTION A: DEMOGRAPHIC INFORMATION

S.NO	Name of School	Sub-County	Level of students	Teacher's years of experience

SECTION B: Challenges in implementing assistive and digital technologies (Before the intervention)

- 1. Which
 - i) assistive technologies
 - ii) digital technologies

are available for supporting learning of the girls with intellectual disabilities in your school?

2. If you were given a chance, which

- (i) Assistive and
- (ii) Digital technologies

would you ensure are made available to support these girls?

- 3. What were the challenges that you encountered in the process of teaching girls with intellectual disabilities using assistive and digital technologies?
- 4. How did you handle the challenges identified above?
- 5. What were the challenges that girls with intellectual disabilities encountered in the process of learning using assistive and digital technologies before the tablet that was given to your school?

SECTION C: Specific experiences and challenges encountered when interacting with the provided digital technology.

You took part in the use of the digital technology (tablet) in teaching the girls with disabilities.

- 1. What challenges did the girls encounter when interacting with the tablets?
- 2. How can such challenges be addressed?
- 3. Did you encounter any problem or challenge when using the tablet in the classroom?
- 4. How can such challenges be addressed if any?
- 5. What are the success stories in your experience with the use of the tablet?
- 6. Suggest recommendations that would enhance the use of assistive and digital technologies in the process of teaching-learning for girls with disabilities in Kilifi County.

THANK YOU FOR YOUR COOPERATION.

Appendix 6

CODE MONITORING TOOL FOR COMPLIANCE IN USE OF TABLETS

Interview Data (to be filled in by enumerator)

Date / / / Res	pondent	No.:					
School Code:							
Dear respondent, the purpose of this visit is to get feedback from you	on use c	of the ta	blet.				
1. Having visited you on and delivered the tablet to your school, when exactly were you able to access it for use in class?							
	••••	• • • • • • • • • • •					
2. Was the training given to you on how to use the tablet adequa	te? NO		YES				
3. a. Have you been using the tablet to teach the girls? b. <i>If NO</i> , why?	NO		YES				
	•••••	• • • • • • • • • •	•••••				
 c. If YES, how often have the targeted learner(s) been able to access the tablet? Give a rating Rarely A few days a week Daily							
d. How many hours a week does the learner engaged in using	the table	et?					
4. Have the targeted learners had opportunities to use the tablet	on their o	own? Ez	xplain				
5. The tablet was loaded with content to develop specific skills	for the le	arner. V	Which of the				
following skills have learners been able to learn from the con-	tent prov	ided in	the tablet?				
Self-Care Skills	NO	YES	Don't Know				
Performs personal grooming and hygiene tasks independently.							
Observes safety precautions.							
Communication Skills							
Communicating needs and desires to others							
Taking turns talking during conversation.							

Relating emergency information in case of an emergency	
Following through on oral directions given to a group	
Social Skills	
Using social phrases appropriately (e.g. please, hello, sorry, thank	
you)	
Following classroom rules.	
Interacting without displaying negative physical or verbal behaviors.	
Academic Skills	
Reading some simple sight words/ pictures.	
Following through on oral directions given by the teachers.	
Maintains effort despite initial problems or failure.	
Occupational Skills	
Performing work with little or no supervision.	
Working until assigned tasks are complete	
Handling some little money and making change	

6. What challenge(s) have you experienced in engaging the learners in using the tablet for learning?

.....

7. What recommendations can you make to make the teaching and learning experience richer?

.....

THANK YOU FOR YOUR COOPERATION

9.0 Researchers' Profiles



Dr. Nancy Abwalaba, Ph.D., OGW

Dr. Nancy Abwalaba is a distinguished educator and lecturer in the School of Education at Pwani University, Kenya, with over 35 years of teaching experience across various levels of the Kenyan education system. Her professional interests include Teacher Education, Policy Studies, Early Childhood Education, Pedagogy, Gender Empowerment, and Community Outreach.

Through her outreach efforts, she empowers communities to identify their strengths and weaknesses and fosters inclusive development initiatives. Nancy's exceptional contributions to community development earned her the prestigious Presidential Award: Order of the Grand Warrior. She has actively participated in notable international conferences, including: The International Conference on "Women and Child Issues" at Punjabi University, Patiala, India; "Gender Studies in the Age of Globalization," organized by the Faculty of Letters, Spiru Haret University, Bucharest, Romania and facilitated a workshop on Gender Responsive Budgeting in Kilifi County, Kenya.



Dr Jerita Mwambi holds a PhD in Applied Statistics from Pwani University, Kenya and a Master in Social Statistics from the University of Nairobi, Kenya. She is a statistics lecturer in the Department of Mathematics and Computer Science at Pwani University. She is keenly interested in educational research, statistical modeling, and data analysis. As an educator, Jerita has vast experience teaching girls in high schools and institutions of higher learning, hence the passion for girls' education and how to overcome the hurdles towards achieving that.



Dr. Sarah Mwangi is a Senior Lecturer, Teacher Trainer and expert in Special Needs Education. She is the SNE Program Leader in the Department of Educational Psychology and Special Needs at Pwani University, Kenya. Her areas of specialization and enquiry focus on all areas of Special Needs and Disabilities, training and mentoring students and researchers in the field of Special Needs. She is also an expert in designing Special Education Training Manuals, Teacher Trainer and has facilitated instructional training programs for teachers. She has also participated in several SNE Community Empowerment Programs and has vast experience in teaching students with Special Needs.

She has supervised students at PhD and Masters Level and reviewed several papers for publication. She holds a Doctorate and Master's degrees in Special Needs Education from Kenyatta University.



Dr. Sellah Lusweti is a lecturer, researcher and consultant based at Pwani University in Kenya. She holds a PhD in Educational Psychology from Pwani University and a Masters' degree in Educational Research and Evaluation from University of Botswana. She is currently the Chair of Department for the Department of Educational Psychology and Special Needs at Pwani University. She has 15 years' experience teaching psychometrics, measurement and evaluation, and research at university level. Her research strength is driven by robust application of methodology, instrument construction and data analysis for qualitative and quantitative data. She has extensive experience working with multi-disciplinary groups to foster cross-disciplinary research in areas such as violent extremism, impact assessment, special needs and One Health.