

Influence of Environmental Supports on Learning Outcomes among Learners with Autism Spectrum Disorders in Special School Setting In Kenya

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Abstract: *The study investigated the Influence of Environmental Supports on Learning Outcomes among Learners with Autism Spectrum Disorders in Special School Setting in Kenya. The study population comprised 420 teachers and 30 head teachers, 30 deputy head teachers and 360 teachers in the 30 selected special schools in the North Rift and Western regions of Kenya. The study used convergent parallel mixed methods design. The sample size for this study comprised 200 teachers from 25 schools. Simple random and purposive sampling was used to sample the participants. Data was collected through a survey comprising self-administered questionnaires; in-depth interviews, and classroom observations. Face and construct validity was ensured using expert judgment by university supervisors while reliability was ensured by split-half method and an $r=0.858$ was reported. Quantitative data was analyzed using descriptive statistics and also inferential statistics such as Pearson Correlation and Regression analysis. Qualitative data on the other hand was analyzed by using thematic framework. Reliability was determined by internal consistency and a reliability coefficient of $r=0.752$ was reported. The finding of the study shows that there was statistically significant, but weak positive correlation ($r=.411$, $n=138$, $p<.05$) between use of environmental supports and overall learning outcomes, with the improved use of environmental supports causing improvement of overall learning outcomes. The study recommends that the Kenya Institute of Curriculum Development (KICD) and the Universities should ensure that courses offered in teacher preparation programmes are focused on relevant courses addressing education of learners with autism.*

Key words: *Environmental Supports; Learning Outcomes; Learners; Autism Spectrum Disorders; Special School; Kenya*

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I. Introduction

It is over 70 years since Kanner, (1943) first described the disability now known as autism. Since that time there has been an increase not only in research studies focusing on intervention, but also an increase in the number of learners diagnosed with this disability. Kanner (1943) utilized the following descriptors when characterizing the disability that was labeled as early infantile autism: impaired communication, lack of eye contact, difficulty with social interaction, and exhibited repetitive behaviours. Since the time of Kanner's description of autistic spectrum disorders (ASD), there has not been much change in the symptoms displayed by these learners (National Research Council, 2011). Most of the research on autism focus on the disability and fail to look at the influence of classroom supports issues and how these affect learners with autism. Inadequate information may compromise the capacity of teachers who work with learners with autism (Obiokor, 2004). Learners with autism may display attention deficits, engage in repetitive behaviours, resist environmental changes, and have unusual sensory experiences (National Research Council, 2011). Educational programmes for learners with autism must address communication and language development, social and affective development, behaviour management, life skills and academic. Thus learners with autism present a unique set of challenges to teachers and caregivers (Obiokor, 2004). Consequently identifying effective available classroom supports for this population is a critical task for researchers and practitioners.

Fuller & Heynmann (1989) suggested that research in developing countries should provide more textured portrait of life in classrooms, about how teachers interact with pupils, how exercises are structured and

evaluated and what forms of knowledge are communicated. The context and challenges in different countries are unique and in addition to the international arena, information from the local level in each country is needed. The growing number of learners with autism in general and/or special education classrooms presents an instructional challenge for special educators who are now faced with a classroom of learners with diverse academic skills and learning styles as well as behavior challenges (Fuller & Heymann, 1989). Teachers are charged with structuring the classroom around task-oriented goals that emphasize learning mastery. Teachers therefore must provide positive reinforcement to learners for setting and achieving personal learning goals (Malague, 1995). Lack of expertise in educating learners with autism has been identified as a clear barrier to effective programming in schools (Mc Fadden & Bruno, 2006). In addition to lacking professional expertise, schools are also challenged to understand exactly which interventions are most appropriate to meet the needs of learners with autism. All this suggests that schools could be struggling and in many cases fail to meet the needs of the growing autism population.

Some recent studies in Africa on the historical developments of special needs education have been made in developing countries like Ghana (Avoke, 2001) and Nigeria (Obinkor, 1998). Other studies concerning special needs education in developing countries have focused on current policies and provisions. Eleweke & Rodda (2002), for example discussed the challenges of educating learners with special needs including those with autism in developing countries. Gwalla-Ogisi, Nkebinde & Rodrigues (1998) described the provision and challenges of special needs education in the reformation of South African society, and Peresistisuh & Barchem (1998) outlined the provision of special education in Zimbabwe. In both cases the education of learners with autism is a challenging issue that requires more and in depth studies.

Although inclusive education is considered as the preferred strategy to meet EFA goals, lack of funding and comprehensive reforms makes its successful actualization unlikely (Avoke, 2001). The current study focused on education of learners with autism in special education setting and the challenges associated with it. Further, successful education of learners with autism requires more in depth studies of the disability and its unique characteristics. Without requisite knowledge of what classroom supports are available for this category of learners in special education setting meaningful inclusion may not be achieved for learners with autism. Based on present state of knowledge and situation in Africa, more studies are needed to address the issue of instructional environment for learners with autism and characteristic presentation of autism spectrum disorders among African learners with autism. In Ghana learners with disabilities and in particular those with autism are overwhelmingly underrepresented in the Ghanaian education system, and that special education needs of those who are enrolled are not sufficiently met (Anthony, 2009). Findings of a study in Zambia (Ojalla, 2004) indicate that teachers have a rather clear idea of how they want to work but have few resources for implementing a meaningful curriculum for learners with autism and other disabilities. This suggests lack of priority in the provision of education for learners with autism. It is also possible that attitudinal barriers could play a role in the limited access to education afforded to these groups of learners.

All learners benefit from routine and predictability, yet this is demonstrated more so for learners with ASD as evidenced through preferences for order, sameness and stability. Unforeseen changes to a schedule or routine can cause a child with an ASD to become easily upset (Lord & McGee, 2001). As with the selection of evaluations, the level and structure of a learning environment varies based on individual learners's age, development, ability level, and diagnostic characteristics. A review of the literature (Bergeson, 2008; Henry & Myles, 2007) has shown that effective programmes for learners with ASD include structured environments with attention to physical structure, routine and the use of visual supports. The first step therefore a special needs education teacher can take is to foster a supportive learning environment for those diagnosed with ASD in regards to the classroom set up (Thiess, 2008). Nickels, (2010) qualitative case study support the idea that involvement of key stakeholders like parents and teachers in the education of learners with ASD has positive effects on their learning. Bean, (2010) revealed that in the RVM and ASD groups, only the consistent-gaze followers performed better than chance on the word-learning tasks. Fargo, (2013) study showed that the learners improved their social skills and liked to learn in such a learning environment. It is therefore important to focus on the classroom environment as one of the supports in the education of learners with autism. Parsons (2006) indicate positive strides in the learner's social skills through the use of video modeling along with the learner's willingness to speak to unfamiliar peers and working in groups with confidence. The parent survey reported positive results as well. They indicated their learners decreased time spent alone, increased in social participation and reduced social anxiety. In another study, Mitchell, Parsons and Leonard (2006) reported that interactive learning through role play in virtual environments may support imagination and problem solving in a realistic context. Kira (2013) study revealed a lack of supervision, training, and skills. The lack of training and supervision resulted in paraprofessionals learning through trial and error. Paraprofessionals supporting learners with ASD felt qualified to complete their duties as a result of personal disposition and effective supervision. Jefferson, (2016) qualitative case study show that the researcher identified four dominant themes that appeared during the interviews, the data review and the observations. Christensen, (2011) found that learners are

more likely to interact with peers on the playground, and more likely to interact with adults in the classroom. It was also found that interactions on the playground were more likely to be positive.

Provision of education for all learners with special needs in education, including those with autism is supported by some working documents. The Constitution of Kenya (2010) endorses education for all learners including those with autism without any discrimination. Special Needs Education Policy (2009) is in place and aims to achieve education for all in line with the constitution. Teachers are often trained at certificate and diploma levels at KISE in Nairobi and for one to be admitted they must have trained to teach in primary schools. Courses at undergraduate and postgraduate levels in special needs education are conducted by public and private universities in Kenya. Despite the kind of training the major concern is that classroom practices as currently established could be set to support the 'norm' and teachers may be reluctant to modify instructions in ways that extend to learners who differ from that 'norm' such as those with autism spectrum disorders (Cohen 2012). Traditionally, autism was seen as psychotic disorders, a curse or a consequence of witchcraft (Matasio, 2011). The researcher argues that most learners with ASDs in Kenya are usually hidden away in homes, locked behind doors or chained for life. In 2003 a group of parents in Nairobi decided to form the Autism Society of Kenya (ASK) that lobbies for autism to be classified as a category of its own (Matasio, 2011). The Ministry of Education acted on the parents demands in the same year and established the first public special unit for learners with autism spectrum disorders at City Primary School in Nairobi (Okwemba, 2003a and 2003b). In Nairobi County alone over 500 learners have been assessed and found to have autism spectrum disorders. Statistics about the number that is in school and the overall population in the whole country is not readily available (Autism Society of Kenya, 2007). It is estimated that approximately 4% of the Kenyan population has autistic spectrum disorders (Autism Society of Kenya, 2007). The ever increasing number of learners with autism has heightened the need for educators to provide appropriate programmes for learners with autism (Cohen, 2012). Cohen further argues that designing an educational programme that meets the needs of learners with autism is a challenge for teachers and head teachers. Classroom teachers are key decision makers in adapting instructions to the needs of learners in special education setting and therefore it is imperative to investigate the types of classroom supports they use when teaching. As a result of the rising need to provide education for learners with autism, and the significant role of teachers, it is necessary to investigate the influence of classroom supports in the education of learners with autism. The current instructional conditions and strategies in use in schools in North Rift and Western regions of Kenya may not benefit learners with autism.

II. Research Methodology

The study population comprised 420 teachers and 30 head teachers, 30 deputy head teachers and 360 teachers in the 30 selected special schools in the North Rift and Western regions of Kenya. The study used convergent parallel mixed methods design. The sample size for this study comprised 200 teachers from 25 schools. Simple random and purposive sampling was used to sample the participants. Data was collected through a survey comprising self-administered questionnaires; in-depth interviews, and classroom observations. Face and construct validity was ensured using expert judgment by university supervisors while reliability was ensured by split-half method and an $r=0.858$ was reported. Quantitative data was analyzed using descriptive statistics and also inferential statistics such as Pearson Correlation and Regression analysis. Qualitative data on the other hand was analyzed by using thematic framework. Reliability was determined by internal consistency and a reliability coefficient of $r=0.752$ was reported.

III. Findings & Discussions

The second objective of the study was to investigate the influence of environmental supports towards learning outcomes among learners with ASDs. The views of the teacher respondents were sought using Likert scaled questionnaires which investigated how often the environmental supports were used in the teaching of learners with ASD and, the importance of those environmental supports towards improving learning outcomes. From the views of the teachers who took part in the survey, the findings of the study show that there were divergent views on how often the environmental supports are used in the teaching of learners with ASD. For example, the average rating (mean= 3.82; SD=0.72) of the use of environmental supports in teaching learners with ASDs reveal that there was generally less often use of the environmental supports, as was revealed by Table 1.

Table 1: Teachers Views on the Use of Environmental Supports

Item	1	2	3	4	5	Mean	SD
Clear boundaries and designations are used to differentiate areas in the classroom.	17 (12.3%)	15 (10.9%)	14 (10.1%)	60 (43.5%)	32 (23.2%)	3.54	1.29
Physical proximity is considered when designing the physical structure of the classroom.	8 (5.8%)	1 (0.7%)	37 (26.8%)	50 (36.2%)	42 (30.4%)	3.85	1.05
Directly teaching learners' behaviour expected for each area.	0 (0.0%)	18 (13.0%)	32 (23.2%)	66 (47.8%)	22 (15.9%)	3.67	0.90
Learners are engaged in a task for appropriate period of time.	0 (0.0%)	10 (7.2%)	41 (29.7%)	51 (37.0%)	36 (26.1%)	3.82	0.90
Considerations are given to how time is allocated in instructional settings.	1 (0.7%)	21 (15.2%)	34 (24.6%)	45 (32.6%)	37 (26.1%)	3.70	1.05
Time on task is lengthened and sustained through use of interval schedules.	2 (1.4%)	21 (15.2%)	14 (10.1%)	67 (48.6%)	34 (24.6%)	3.80	1.02
A variety of activities are planned and scheduled each day.	8 (5.8%)	7 (5.1%)	29 (21.0%)	47 (34.1%)	47 (34.1%)	3.86	1.12
Highly preferred activities are used to reinforce participation in less preferred activities.	0 (0.0%)	7 (5.1%)	18 (13.0%)	59 (42.8%)	54 (39.1%)	4.16	0.84
Activities that consist of high levels of movement are interspersed with activities that are more sedentary.	7 (5.1%)	5 (3.6%)	42 (30.4%)	62 (44.9%)	22 (15.9%)	3.63	0.96
Providing information visually to serve as an antecedent prompt.	0 (5.1%)	15 (10.9%)	20 (14.5%)	68 (49.3%)	35 (25.4%)	3.89	0.91
Visual systems are used to facilitate receptive language, joint attention and communicative gesturing.	7 (5.1%)	6 (4.3%)	11 (8.0%)	54 (39.1%)	60 (43.5%)	4.12	1.06
Average mean usage of Environmental Support						3.82	0.72

Key: 1-Hardly ever, 2-Sometimes, 3-Occasionally, 4-Frequently, 5-Always and SD-Standard deviation.

Source: Survey data (2017)

The findings of the study show that use of highly preferred activities were the most frequently (mean=4.16; SD=0.84) used environmental supports strategy put in place to reinforce participation in less preferred activities among the learners with ASDs. Similarly, more than seven eighth 114 (82.6%) of the teacher respondents agreed that visual systems were frequently (mean=4.12; SD=1.06) used to facilitate receptive language, joint attention and communicative gesturing. This finding corroborates Nickels,(2010) qualitative case study who reported that nine themes emerged describing parent and teacher perceptions of educational interventions they found effective for learners with ASD. These themes were intensive early intervention using multiple methods; a structured learning environment; adult-mediated and peer-mediated interventions for social and communication skills; inclusion with a balance of direct services; support staff to facilitate inclusion; a functional approach to problem behaviors; alternative and augmentative communication interventions; and sensory-motor interventions.

The study reported that there were several environmental supports that are used to influence the learning outcomes among learners with ASD. The study reported that the environmental supports included were arrangement of classrooms and well-designed sitting arrangements in the classrooms. The study reported that the environmental supports greatly enhanced academic outcomes among learners with ASD. The participants reported that the environmental supports help create a conducive learning atmosphere in classrooms in schools. This makes the learners have the right environment that would assist them to concentrate on the academic work in schools. One participant reported that:

The environment provided to the learners with autism helps them to adjust to the academic standards in class since they are able to do more in class and school. (HT, 13)

From the interview excerpt above, it can be argued that the environmental supports are very crucial in enhancing academic outcomes among the learners with ASD in schools. The environment needs to be very friendly so as to ensure that learners are comfortable in the school and classroom environments. This finding is consistent with Bean, (2010) who reported that, the ASD group demonstrated greater participation within group variability in their attention than the RVM group. Gaze following was variable across (and within) the ASD group. Overall the finding suggests that purposeful approaches to providing opportunities for learners with ASD will guarantee the acquisition of skills and reward interactions with peers. However, most of the environmental supports strategies were occasionally used to enhance learning outcomes among the learners with ASDs. For example, clear boundaries and designations were occasionally used (mean=3.54, standard deviation=1.29) to differentiate areas in the classroom. On the same note, physical proximity was always (mean=3.85; standard deviation=1.05) considered when designing the physical structure of the classroom. The findings agreed with Fargo, (2013) who reported that the learners improved their social skills and liked to learn in such a learning environment. It is indeed important to note that social skills deficits are one of the most cited characteristics of

learners with ASD. Though there are individual variations like other prevalent characteristics, it is important for learners with ASD to have consistent and planned interactions.

The results of the survey established that there was considerable use of the environmental supports among the learners with ASDs. The study revealed that some of the strategies of environmental supports occasionally used include; engagement of learners in a task for appropriate period of time (mean=3.82; SD=0.90), time on task is usually lengthened and sustained through use of interval schedules (mean=3.80; SD=1.02), use of a variety of activities were planned and scheduled each day (mean=3.86; SD=1.12). Slightly more than a quarter 37 (26.1%) of the teacher respondents confirmed that considerations were given to how time was allocated in instructional settings. The results of the study show that activities that consist of high levels of movement were frequently (mean=3.63; SD=0.96) interspersed with activities that were more sedentary. The findings are consistent with Delano (2007), who reported that socialization, anxiety over change, conversation skills, and attitudes towards the social skills class are key considerations in the classroom environment. The results indicate positive strides in the learner’s social skills through the use of video modeling along with the learner’s willingness to speak to unfamiliar peers and working in groups with confidence. If the interventions are successful through specialized instruction, conditions, adaptations or modifications it could therefore be necessary to consider general education setting for learners with ASD.

The study also reported that the environmental supports which were used in the school somehow enhanced the academic outcomes among learners with ASD. This is because it enhanced the concentration and retention of content that has been learnt by the learners in school. This has helped learners to focus and keep track of what teachers teach in class. One respondent reported that:

In my opinion, the use of environmental supports is the key to learning among learners with ASD since it enhances concentration and retention of what is being taught. (HT, 7)

From the interview excerpt above, it can be explained that environmental supports increase the absorption span of the learners with ASD as they are able to stay in class for longer hours without losing touch of whatever is being taught in class. The findings corroborate that of Mitchell, Parsons and Leonard (2006) that interactive learning through role play in virtual environments may support imagination and problem solving in a realistic context. However, it came to light that some strategies that could have been used under environmental supports were not frequently used by teachers. For instance, 32 (23.2%) of the teachers who took part in the survey confirmed that they only sometimes directly taught learners behaviour expected for each area. This suggests that teachers of learners with ASD must understand the shared features of autism to properly respond to and provide for the individual needs of the learners.

The null hypothesis was tested using a Pearson Product Moment Correlation Coefficient, with overall scores on environmental supports as independent variable and learning outcomes among the learners with ASDs as dependent variable. The p-value was set at .05, the null hypothesis was rejected when the p-value was less than .05 but it was accepted when the p-value obtained was greater than .05. Table 4.15 shows the correlation analysis results in SPSS output.

Table 2: Use of Environmental Supports and Overall Learning Outcomes

		Use of Environmental Supports	Overall Learning Outcomes
Use of Environmental Supports	Pearson Correlation	1	.411**
	Sig. (2-tailed)		.000
	N	138	138
Overall Learning Outcomes	Pearson Correlation	.411**	1
	Sig. (2-tailed)	.000	
	N	138	138

** . Correlation is significant at the 0.01 level (2-tailed).

The finding of the study shows that there was statistically significant, but weak positive correlation ($r=.411$, $n=138$, $p<.05$) between use of environmental supports and overall learning outcomes, with the improved use of environmental supports causing improvement of overall learning outcomes and vice-versa. Since the p-value was less than 0.05, the null hypothesis which stated that, “there is no statistical significant influence of environmental supports on the learning outcomes among learners with autism spectrum disorders” was rejected. Consequently, it was concluded that use of environmental supports has a positive influence on teaching and learning outcomes among the learners with ASDs. In addition, to illustrate this relationship, a scatter plot was generated as shown in Figure 1.

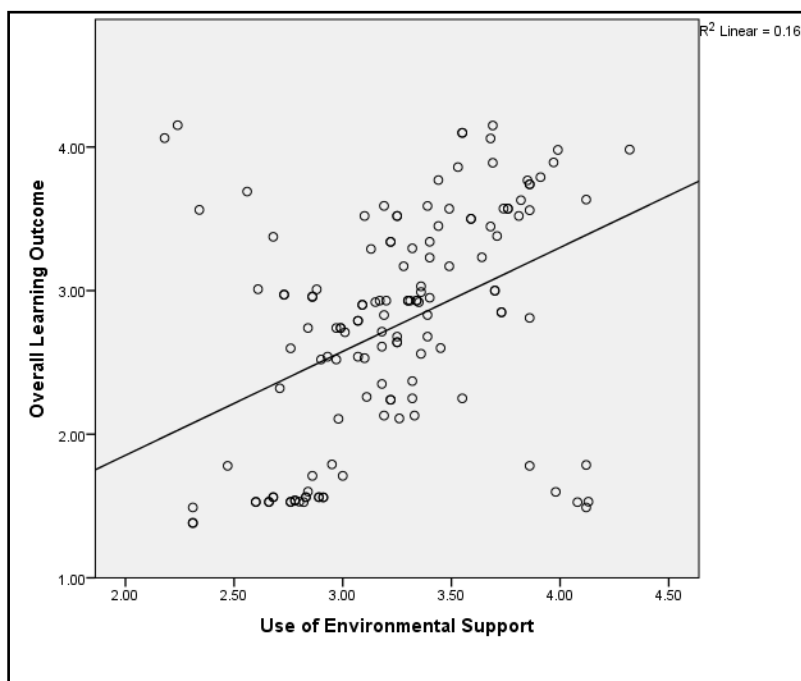


Figure 1: Influence of Environmental Supports on Learning Outcomes

From Figure 1, the scatter plot shows that there was evidence of a positive correlation between environmental supports and overall learning outcomes. The pattern of dots seems to slope from lower left to upper right, an indication of a positive correlation between the two variables. The line of best fit (identity line) further reveals that there was correlation between the two variables. The scatters tend to concentrate in the vicinity of the identity line, meaning the relationship was real and not by chance. To estimate the level of influence of environmental supports on overall learning outcomes, a coefficient of determination was computed. This was done using regression analysis and the results were as shown in Table 2.

Table 2: Model Summary on Regression Analysis of Influence Environmental Supports on Learning Outcomes

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.411 ^a	.169	.163	.73288

a. Predictors: (Constant), Use of Environmental Supports

From the model summary, use of environmental supports accounted for 16.9% ($R^2 = .169$) of the variation in learning outcomes among learners with ASDs. However, to determine whether use of environmental supports was a significant predictor of learning outcomes, Analysis of Variance (ANOVA) was computed as in Table 4.17.

Table 3: ANOVA–Influence of Environmental Supports on Learning Outcomes

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	14.855	1	14.855	27.658	.000 ^b
Residual	73.047	136	.537		
Total	87.902	137			

a. Dependent Variable: Overall Learning Outcome

b. Predictors: (Constant), Use of Environmental Supports

From Table 3, it is evident that use of environmental supports in utilization of classrooms activities was a significant predictor of overall learning outcomes among the learners with ASDs [$F(1, 136) = 27.66, p < .05$]. Hence, it can be argued that the use of environmental supports significantly influence overall learning outcomes among the learners with ASDs.

Further, the study sought to investigate the relationship between environmental supports and the individual aspects of learning outcomes (cognitive outcomes, behavioural outcomes, social/emotional outcomes and communication outcomes). This was done by use of a Pearson Moment Correlation Coefficient as indicated in Table 4.

Table 4: Correlation between Aspects of Learning Outcomes and Environmental Supports

		Cognitive Outcomes	Behavioural Outcomes	Social/Emotional Outcomes	Communication Outcomes
Use of Environmental Support	Pearson Correlation	.387**	.381**	.392**	.193*
	Sig. (2-tailed)	.000	.000	.000	.023
	N	138	138	138	138

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

The findings of the study show that there was significant positive correlation between use of environmental supports and all the four aspects of learning outcomes. Social/emotional outcomes had the strongest positive correlation ($r=.392, p<.05$) with environmental supports, while communication outcomes had the weakest ($r =.193, p=.023$). The findings validate the claim of Bergeson (2008), who claimed that effective programmes for learners with ASD include structured environment with attention to physical structure, routine and use of visual supports.

IV. Conclusion & Recommendation

The findings of the study show that there were statistical significant positive correlation between use of environmental supports and all the four aspects of learning outcomes. Social/emotional outcomes had the strongest positive correlation with environmental supports, while communication outcomes had the weakest. It was concluded that use of environmental supports has a positive influence on teaching and learning outcomes among the learners with ASDs. The Head teachers should ensure that there is more collaboration between parents, teachers and other stakeholders to provide effective learning environment for learners with autism as well as psychological and emotional support for them. Data in this study revealed that availability of instructional supports increased rate of memory among learners with autism.

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