International Journal of Education, Learning and Development
Vol.6, No.9, pp.38-50, September 2018
Published by European Centre for Research Training and Development UK (www.eajournals.org)

CHALLENGES FACED BY STUDENTS WITH VISUAL IMPAIRMENTS WHEN LEARNING PHYSICS IN REGULAR SECONDARY SCHOOLS

Alianda Bwire Maindi

Physics Teacher, St Benedicts High School-Budalangi, Box 11 Port Victoria, 50410.Kenya

ABSTRACT: *The curriculum in regular schools is designed for fully sighted children and is delivered largely through sighted related tasks. The preponderance of visually oriented and visually complex concepts and information in science classrooms poses significant challenges to learning among visually impaired students. Without systematic instructional attention to these challenges science may seem inaccessible to many students with visual impairment, (Kumar et al 2001).This study investigated the challenges faced by students with visual impairment when learning physics in regular secondary schools. The intention of the study was to make policy makers to be aware of the difficulties that visually impaired students encounter when learning physics in regular secondary schools .The visually impaired students would then be supported so that they can overcome these difficulties. This would promote the national special needs educational policy framework which advocates for inclusive education. The objectives of the study was to identify problems visually impaired students encounter when learning physics in form two in regular secondary schools .The targeted population in this study was that of form two physics students with visual impairment. One hundred and forty seven students were selected from regular secondary schools within the study area. A purposive sampling technique was applied to identify the VI students within the study location. The location of the study was Busia County, Siaya County, Vihiga County and Kisumu County. The study was guided by the normalization theory. The argument behind it is that a child with whatever kind of disability can live a normal life if given all kind of support just like any other normal child. The data was collected coded and summarized on the basis of objectives of the study. The data was analyzed using SPSS program and reported using frequency distribution tables and percentages. Chi square was used to compare the proportions observed in each category with what would be expected. Test retest technique was used to test the reliability of the research instruments. The study found that classrooms in regular schools lacked adequate light hence are not suitable for accommodation of visually impaired learners. The visually impaired learners were exposed to inappropriate scripts of reading materials and that most of the respondents lacked optical and non-optical devices even though they needed them. The study also found that the visually impaired students did not receive support services from the vision support teachers nor interventional measures to help them overcome their visual limitations. The study recommended that Physics teachers adopt an inductive heuristic approach in teaching Physics to visually impaired learners. The study further recommended that teachers' trainers should include inclusive education in their curriculum and that Ministry of Education should come up with proper guidelines about inclusive education. At least each regular school should have a department of special needs managed by a special needs teacher. The government through the MOE should also avail funds to regular secondary schools to enable them modify their environments for the purpose of inclusive education.*

KEYWORDS: Visual Impairment, Regular Schools, Inclusive Education

Print ISSN: ISSN 2054-6297, Online ISSN: ISSN 2054-6300

INTRODUCTION

Visual impairment refer to loss of vision even when an individual person wears corrective lens (Agesa , 2014).

According to Olmstead (2015), the term visual impairment refers to impairment in vision that even with correction, adversely affects a child's educational performance. Learners with visual impairment can be categorised mainly into two groups according to their educational needs. There are those children who need print as their educational medium and those who need to use Braille , (Verneyen, 2004).

However the low vision project groups students with visual impairment in five categories. The first category consists of totally blind student. The second group consists of children with vision which is not enough to read print and hence should be educated in Braille.Kiarie (2004) says that the detection of visual problems in children is done by either parents or doctors. However severe eye problems can be detected in hospitals by the eye units. Vision problems can also be detected by tutors in general educational classrooms using behavioural characteristics that may indicate visual function problems. For instance Students with visual problems may: Usually turn their heads or eye, hold reading materials extremely close to the face or fail to make eye contact when talking to people.

The major challenge facing visually impaired students in the science educational environment is the overwhelming mass of visual material to which they are continuously exposed to e.g. text books, class outlines, class schedules and chalkboard, (Keller et al 2009). The curriculum in regular schools is also designed for fully sighted children and is delivered largely through sight related tasks. If a student has difficulty seeing material at a distance, writing on chalkboards will be hard to discern. The visually impaired can therefore either be provided with optical devices, preferential seating with hand outs containing pertinent information, (Bishop 1996). He also says that curriculum areas such as sciences that require hands on activity and interaction with materials can also present a challenge to students with visual impairment. Hence specialized instruments with large numbers as inventive ways of existing materials can help the visually impaired overcome barriers. Optical devices include magnifiers, microscopes, telescopes and lenses. These devices can be used for viewing regular prints materials while some students with low vision require their texts to be transcribed into Braille; many are able to access regular or large print. Large print books and papers can be created through modern copy machines even though such copies are often of poor quality. Lengthy texts such as novels might also be presented on audiotapes. However it is recommended that audiotape materials not be stressed until students develop the requisite basic literacy skills.

The Problem

The curriculum in regular schools is designed for fully sighted children and is delivered largely through sight related tasks. Physics is one of the subjects being offered in regular secondary schools. Physics relies a lot on sight and touch in both theory and practical lessons. The visually impaired students must overcome many obstacles involving sight if they hope to gain from physics instructions. Yet there is no systematic study that has addressed the problems encountered by these visually impaired students in physics classes. There is need therefore to identify academic problems visually impaired students encounter when learning physics in regular secondary schools. It is also important to find out the status of support resources and

Print ISSN: ISSN 2054-6297, Online ISSN: ISSN 2054-6300

services and their impact on the performances of physics by visually impaired students in regular secondary schools.

The purpose and objective of the study

The study sought to identify the educational problems that visually impaired students encounter when learning physics in form two in regular secondary schools, It purposed to highlight the desirable difficulties that visually impaired students encounter when learning physics in regular secondary schools.

Theoretical Framework

The study was guided by the normalization theory as articulated by Wolf Wolfensberger (1980). Normalization involves the acceptance of people with disabilities with their disabilities, offering them the same conditions as are offered to other citizens. It involves the normal conditions of life – housing, schooling, employment, exercise, recreation and freedom of choice. Until relatively recently people with learning disabilities were often rejected and socially excluded from mainstream society. Poor attitudes towards people with learning disabilities could be countered through inclusion and creating opportunities to take on valued social roles, these could include the family member, neighbors or even employee. These would help to see people with learning disabilities as valued individuals, changing the presumption that those with learning disabilities are fundamentally different, (Wolfensberger, 1972).

MATERIALS AND METHODS

The study used descriptive survey design to explore the educational problems that visually impaired students encounter when learning Physics in ordinary secondary schools. Descriptive survey design was used to obtain information that describes existing phenomena. Apart from just describing, survey is used for explaining or exploring the existing status of two or more variables at a given point in time (Mugenda and Mugenda, 2003).It was used to gather, summarize and interpret information for the benefit of the study

The target population included one hundred and forty seven learners with visual impairment within the study location. .The data was collected using questionnaires and test schedules which were validated and piloted for reliability test using Pearson's Product Moment Correlation r with values .657 and .643 respectively. Data was analyzed using descriptive statistics(frequencies and percentages0 and inferential statistics; chi square was used to compare the proportion observed in each category with what would be expected.

RESULTS

Classroom environment and how it affects Physics learning

The respondents were asked to respond to issues related to classroom environment, nature of script reading material and optical interventions.

Respondents views on light in the classroom

Print ISSN: ISSN 2054-6297, Online ISSN: ISSN 2054-6300

Table 1: Respondents View on Light in the Classroom

	Response			
Condition	**Agree**	**Not sure**	**Disagree**	**Total**
	No (%)	No (%)	No (%)	No (%)
Adequate light	46(31.3)	36(24).	65(44.2)	147(100)
Glare from Reflection avoided	33(22.4)	12(8.2)	102(69.4)	147(100)

From the above data 65 (44.2%) respondents indicated that there was inadequate light in the classroom, while 46(31.3%) agreed that there was adequate light. Thirty six (24.5%) were not sure meaning that there could be adequate light sometimes and inadequate light some other times.

The results in the table also indicated that 102 (69.4%) disagreed that they are assisted to avoid glare from reflection. Thirty three (22.4%) agreed that there was no glare from reflection and 12 (8.2%) percent were not sure. That was interpreted to mean that 8.2% felt that sometimes they are affected by glare and some other times they are not.

To determine the significance of the distribution a chi square test statistic was done (see appendix 5). The calculated value for 2 df at 5% significance level was 22.34. This is higher than the table value of 5.991. These results indicate that the distribution of findings is significantly different from the expected distribution. It implies that the visually impaired students are not aided in dealing with light in the class environment

Finding about the script of reading materials used.

On the enquiring about the nature of script of reading material morally type of front, size of front, use of colour the responses were as indicated in the figure below.

Table 2: Nature of Script of Reading Materials

Script concern	**Useful**	**Various**	**Not Useful**	**TOTAL**
	NO(%)	NO(%)	NO(%)	NO (%)
Type of front	21(14.3)	88(59.9)	38(25.8)	147(100)
Size of front	19(12.9)	51(34.7)	77(52.4)	147(100)
Use of colour	24(16.3)	42(28.6)	81(55.1)	147(100)
Illustrations and Diagrams	54(36.7)	45(30.6)	48(32.7)	147(100)

From the table above 88(59.9%) respondents indicated that they read scripts of various types of front. Thirty eight (25.8%) indicated that the type of front used sometimes is not useful and twenty one (14.3%) respondents indicated that front used was useful and adequate.

About the size of front used, 77 (52.4%) indicated that the front used was inadequate meaning that the students would strain to read and hence needs special care, especially when letters written on the blackboard are not large enough. Fifty one (34.7%) indicated that they are exposed to various sizes of fronts meaning that sometimes letters used on the blackboard and note books are small and sometimes big. The spacing of the letters and words could also be

Print ISSN: ISSN 2054-6297, Online ISSN: ISSN 2054-6300

varying. Nineteen (12.9%) respondents indicated that the size of front used was adequate, readable and hence useful.

Eighty (55.1%) of the respondents indicated that the colour used was not useful meaning that minimum effort was made to incorporate colour mixture when writing on the blackboard and other written scripts.

Forty two (28.6%) indicated that scripts are presented in various colours meaning that use of different colours in presenting reading materials to the learners was encouraged. Twenty four (16.3%) of the respondents indicated that the colour used was useful, readable and adequate.

Fifty four (36.7%) indicated that scripts and diagrams are properly illustrated meaning that they are of readable size, entries clearly described and clustered and adequate colour was used. But forty eight (32.7%) said that diagrammatic illustration were inadequate meaning that diagrams and entries in the tables were not clearly described or entered. Forty five (30.6%) indicated that the diagrams and illustrations varied i.e. sometimes they were adequate and sometimes inadequate

The challenges encountered by some visually impaired learners therefore could include type of front, use of color, size of front, illustrations and diagrams. To determine the significance of the distribution a chi square test statistic was done .The calculated value for 6df at 5% significance level was 77.21924. This is higher than the table value of 12.592.This is an indication that this distribution of the findings is significantly different from the expected distribution. It implies that the visually impaired students have a problem with nature of script of reading materials

Availability and use of optical instruments and non-optical instruments.

The study also investigated the availability and use of optical instruments and non – optical instruments. The findings were presented in the diagram below.

Table 3: Availability and Use of Optical Instruments

Optical Interventions	Availability	In use	Not available
Corrective lenses (convex and concave)	51(34.7)	47(31.9)	96(65.3)
Magnifying lenses (hand magnifiers etc)	48(32.7)	42(28.6)	99(67.3)
Others (telescopes absorptive lenses and filters)	3(2.04)	2(0.014)	5(3.4)

(Total, N =147)

From the table above the most available optical devices are corrective lenses. Fifty one (34.7%) respondents indicated that they have them. However 47(32%) confirmed that they actually use the devices but 96 (65.3%) indicated that they do not have them even though they need them. Four (2.72%) had corrective lenses but they were not using them. Other available optical devices are hand magnifiers. Forty eight (32.7%) of the student respondents indicated

Print ISSN: ISSN 2054-6297, Online ISSN: ISSN 2054-6300

that they have magnifying lenses. Forty two (28.6%) said that they have magnifying lenses and are using them.

That meant that 6(4.08%) were having lenses but not using them. Only 3(2.04%) indicated that they have other optical devices like telescopes, absorptive lenses and filters.

The table value of $\chi 2$ for 4 degree of freedom at 5% level of significance is 9.488 but the manually calculated value of chi square is 56.26.The difference is significant.

The study also investigated the use non optical interventions for easing vision problems. The results are as indicated below.

Table 4.: Availability and use of non-optical devices

Non optical Intervention	Availability No (%)	In use	Not available No (%)	Total No (%)
Large print material	38(25.9)	38(25.9)	71(48.3)	147(100)
Felt pen	63(42.9)	51(34.7)	33(22.4)	147(100)
Book stand	10(6.8)	5(3.4)	132(89.4)	147(100)
Page markers	25(17)	12(8.2)	110(74.8)	147(100)
Reading lamps	3(2.0)	2(1.4)	142(96.6)	147(100)
Others include; audiotapes Additional time and Contrasted print	8(5.4)	8(5.4)	131(89.1)	147(100)

Non optical devices which are commonly available are felt pens. Sixty three student respondents (42.9%) indicated that they use felt pens. Another non-optical device used is large print books. Thirty eight (25.9%) of the respondents indicated that large print books are available and they use them. Page markers were available to 25 (17%) of the respondents. Others were book stands and reading lamps at 10(6.8%) and 3(2.0%) respectively. Other respondents indicated that they were having non optical instruments but they were not using them. Twelve respondents (8.2%) had felt pens but they were not using them. Five (3.4%) of the respondents had book stands but they were not being used and 13(8.84%) had page markers that were not being used. One respondent had a reading lamp but not using it.

However 109 (74.14%) did not have large print and hence they were not using them. Eighty four (57.14%) did not have felt pens and 137(93.19%) did not have book stands hence were not using them. The respondents who indicated that other interventional measures like audiotapes, additional time and contrasted print were 139(94.5%).

The table value of χ^2 for 10 degrees of freedom at 5% level of significance is 18.307.The manually calculated value of x^2 is 213.48 hence the difference is significant.

DISCUSSION

This study indicates that the visually impaired learners are affected by inadequate light in the regular classrooms. Others are affected by glare from reflections. Point source of light provided such as incandescent lamps can have high light intensities and become discomfort glare

Print ISSN: ISSN 2054-6297, Online ISSN: ISSN 2054-6300

sources. This can be visually distracting for all building occupants and may become a particular problem for visually impaired people to the extent that vision may be disabled, (Bright *et al* 1977).Also, large amounts of light on surfaces will cause contrast to reduce and glare to increase. This glare may initially cause discomfort and where surface luminance is high can disable vision. These are particular problems for visually impaired students in a regular classroom especially when light is reflected from shinny surfaces.

However, the ministry of education says that visually impaired students in regular schools should be aided in dealing with light in the class environment. According to the Ministry of Education (1995) guidelines, the teachers were to ensure that the classroom sitting arrangements should be in such a way that visually impaired student avoids too much light or too little light directed at them. The visually impaired students were to be enabled to avoid glare. Too much light make the visually impaired students to have watery eyes, experience eye pain and fatigue. This makes him or her to have constant difficulty in keeping up while reading or writing (Optometric Extension Programme Foundation1985)

Carney (2003) also says that sitting in the classroom will depend on the functional vision of the student. A source of lighting needs to be considered when welcoming a visually impaired student in the classroom. The challenges encountered by some visually impaired learners therefore could include type of front, use of colour, size of front, illustrations and diagrams . It implies that the visually impaired students have a problem with nature of script of reading materials.

The findings do agree with Turnball *et al*, (2002) who says that students with visual impairment are able to learn using their visual senses if print is altered for their benefit. They need to have print magnified, contrast enhanced or type front and size changed. This is because students in this category characteristically work more slowly and experience difficulty working with details (Colenbrander, 1992).

In a study to examine the perception of front legibility, ease of reading, front sharpness as well as perceptions of front attractiveness and general preference of two Serif (Times New Roman and Georgia) and Sans Serif (Ariel and Verdana), Bernard *et al*, (2001) revealed that participants who were visually impaired perceived 14 point size of front as being easier to read and sharper than 12 point size. All participants significantly preferred the larger 14 point Sans Serif fronts.

The study revealed that visually impaired learners in regular schools are exposed to various sizes of fronts hence they encounter difficulty in reading. That is why Kenya National Examination Council provides large print (font size 18) examination paper and instructions (Kaburia and Kashu, 2001).Large print font size helps in making the reading faster for visually impaired learners however 14 point fonts are more legible ,faster to read and are preferred to the 12 point font,(Benard *et al* 2002)

The study also revealed that visually impaired learners have challenges with use of colour illustrations, diagrams and spacing of letters or words. These findings agree with Macari (2001) who says that processing written characters on a page is difficult for those with reading disorders. Therefore any unnecessary symbols or images will take away their comprehension of necessary information. Use of a Sans Serif front to decrease the like hood that words will run together is advisable .It is also recommended that use of 14 point can increase the size of

Print ISSN: ISSN 2054-6297, Online ISSN: ISSN 2054-6300

letters. Macari, (2001) advises that there should ample space between lines of text and between paragraphs so that readers will distinguish them mentally.

About glare and colour the use of matte paper and white spacing to minimize visual distractions on the page is recommended. Visually impaired people are generally less confident than fully sighted people in differentiating colours. The areas of difficulty are differentiating blue toned green from green toned blue of similar lightness and chrome (Bright, 1997). The finding agrees with what Torres and Corn (1976) say. According to Torres and Corn, the optical devices used by visually impaired students in a regular classroom are magnifying glass, hand magnifiers, stand magnifiers and telescopes. However availability and use of optical devices requires that the children must go through medical assessment and training. It is possible that many visually impaired students in regular schools have not received medical assessment or trained on how to use optical devices.

Some devices are available and not used. This finding agrees with Torres and Corn (1976) who argues that some learners avoid using optical devices because of stigmatization i.e. they avoid using them because of fear of being teased by their normal vision peers. They also say that some students are undecided whether to use optical devices or not. This is because some optical instruments like hand magnifiers, telescopes are cumbersome to use because of the practical nature of the some science subject which require that both hands are free. Those hand magnifiers, telescopes have the disadvantage of keeping one hand of the learner occupied and therefore may not be useful for activities like writing and conducting experiments. Magnifying glasses could be better however they are fragile and may restrict a student's movement for they require fixed steady distance (Dijik, 1995).

Mallory Burton et al (2008) also say that hand held magnifier is an optical device that provides magnification and or illumination. A typical student who would use a portable magnifier is a student with low vision and who has difficulty reading regular print .The findings of this study agreed with that idea because a high percentage of the respondents were found to be using other corrective lenses not magnifying lenses. He also points out that assessment and prescription for hand held magnifier should be done through a low vision clinic or optometrist. Students will require training on the use and care of a hand held magnification. They also need some instructions in navigating printed materials and they should be aware that scratches can affect the quality of the magnifications and regular checking of the glasses is important. It would therefore be difficult to use these magnifiers without proper assessment and training, (WHO 1992).

The study also found that over 70% of the respondents did not have the enlarged materials. This agrees with (Mullory et al 2008) who say that the enlarged print materials can only be available if prepared ahead of time so that the student can participate with peers in the same activity. That student may require additional assistance in organising or using materials. He needs to be aware that enlargement may alter proportions or lengths of mathematical measurements.

Torres and Corn (1995) noted enlargement above 30 point front size is considered inefficient for sustained reading. The standard large front is 18 or 24 points. They also say that many students who previously used books with enlarged type are now learning to use optical devices with regular books. This agrees with the findings because some student respondents who did not have enlarged printed materials could be using optical devices. When other non optical

Print ISSN: ISSN 2054-6297, Online ISSN: ISSN 2054-6300

devices like bookstands are not available improvisation by placing books beneath the books to read can be done (Torres and Corn, 1995).

The study found that over 90% of the respondents were not being given additional time to complete their tasks. That agrees with Selma et al (2011) who says that for students who are visually impaired time limits need to be extended so that the children can be given sufficient time to visually and tactually explore the relevant materials and task environment before receiving the item instructions (especially when the child is asked to point or name objects). They also say that play material and tasks environment need enhancement in colour and contrast e.g. bright colours against dark backgrounds, contrasting colours for the play material, darker lines to accentuate the contours of the pictures and enlarged materials.

From the above findings, it can be concluded that visually impaired learners in regular schools were not provided with non-optical devices even though they required them.

Implications.

The study indicated that the visually impaired learners are affected by inadequate light in the regular classrooms. Other factors included glare from reflections, inappropriate nature of reaching materials, mainly type of front, spacing of letters, colour and lack of optical and non-optical interventions for easing vision problems. Other respondents also had a problem with diagrammatic illustrations and colour used in printing materials.

The Physics teachers should adopt an inductive heuristic approach in teaching physics to visually impaired teachers. To enhance this approach actively scripts, work sheets, directions and detailed practical procedures should be given to learners in advance before the practical or the lesson.

The government through MOEST should also avail funds to regular secondary schools to enable them modify their environment for the purpose of inclusive education.

REFERENCES

Abugi & Odipo (1997). Efficiency of primary education in Kenya. Situational analysis and implications for education reform (Discussion paper*). Nairobi Kenya Institute of Policy Analysis and Research.*

Alberta Education(1996). " Programming for students with special needs*". Special education department.*

Amy M.,(2006). "Creating Postive School Experience for students with Disabilities" *.Proffessischool counselling Journal. pp 66-72.*

Baraga & Evin (1992). "Visual handicaps and learning". *Austria TXPRO – ED*

Barage N., (1970) **"** Teachers guide for development of visual leanrning abilities and utilization of low vision". *The University of Texas at Austin, American Printing House for the Blind. Pp88-96*

Baughman & Zollman (1977)**.** Physics lab for the blind**.** *Physics teacher 15(6) 339 – 442.*

Beattic et al (1997). Modifing altitudes of prospective educators towards students with disabilities and their integration into regular classrooms. *Journal of Psychology 131 245 -259.*

Print ISSN: ISSN 2054-6297, Online ISSN: ISSN 2054-6300

Beckwith & Mathews (1994). Measuring comfort in interacting with people with intellectualdisabiolities**.** *Australian Journal psychology 46(0).*

Benard *et al*, (2003). " Comparing the effects of text size and Format on the Readability of Computer Displayed Time New Roman and Ariel text*". International Journal of Human computer studies 59, 823 – 835.*

Blunkett D., (1995) One clear day London ; *Michael O. Mara Books Ltd.*

Braund & Driver (2002) "Moving to the big school. What do pupils think about science practical work pre and post transfer" *Paper presented at the Annual Conference of the British Educational Research Association.University of Exater, England.*

Bright R., (1997) "colour contrast and perception. Design Guidence for Intenal Built Environment". *The University of Reading*.

Carey K,(2001)."Editorial.British Journal of visual Impairment. Vol 19:1

Carney S.,(2003**),** "Teaching students with visually impairment" *A guide for the support team.*

Catera M., (1993**).** Laboratory adaptations for visually impaired students". *Journal of College Science Teaching.*

Cherono M.,(2003). " National Plans of Education*; East African Regional Workshop on Education for persons with disabillities.*

Colin & Alison Emancipating Disability Research and Special Education Needs Sage pp 233-246 *Daily Nation, 10th March, 2010,* New policy to boost special education in Kenya

Desta D.,(1995). "Needs and provisions in the area of special education"**,** *2nd South Northworkshop*

Devlieger P.,(1989) "Culture- based concepts and social life of disabled persons in Sub-Saharan africa*", An international festival and conference on the Language, culture, and history of Deaf people, Gallaudet University, Washington D.C*

Dion & Mathew (2000) ."Teachers manual for adapting Science experiments for blind and visually impaired students".

Doyle L., (2002), "Leadership and Inclusion Reculturing for reform", *International Jounal of Educational reform 11, 38 – 62.*

Drugall M., (2004) – High school aged youths' atitudes towards their peers with disabilities. The role of school and student interpersonal factors. *International Journal of Disability Development and Education 51 – 287 – 313.*

Durr I., (2010). Success for blind students in mathematics and science. The importance of thinking outside the box*! Paper presented at the seventh International Conference on Higher Education and Disability, Innsbruda Austria.*

Education", *Ministry of Education, Larnaca Cyprus, 2(5) 155 – 159.*

Egelstone D., (1995**) "**Improving Science instruction for students with disabilities" *proceeding of a working conference on science for persons with disabilities. University of Northen Iowa.*

GreenbergD.,"Education in America",*Aview from Sudbury Valley-Special Education.pp 15-20*

Grol C.,(2000) "The education of pupils with Special Education in Africa"**.** *Paper presented at ISEC 2000.*

Hopper & Umansky(2009)**.** "Young children with special Needs"*Pearson* Anne J., 1999 Methods and materials in special education.

Jones M., (2006). Visualizing without vision at the microscale. Students with visual impairement explore cells with touch , *Journal of Science Education and Technology 15 (5) 345 – 351.*

Print ISSN: ISSN 2054-6297, Online ISSN: ISSN 2054-6300

Kaburia & Kashu (2005). "Faireness and equetiy assesement with respect to learners with special needs", *Kenya National Examination Council, Pg1 -10*

Kasayira J., (1995). Primary school Teachers and Heads Attitude towards the needs into

Kathryn M., "Document Design for users with reading disorders". *The University of Menphis.*

Kiarie M.,(2004). "Education of students with visual imparements in Kenya", *International Journal of Special Education. Vol 19 No.2, Pg16 -12.*

Kimanu B, 2012, A vision for the visually impaired

Kothari R.," Research Methods, Methods and Techniques" ,New Age Internatinal (p) limited, pg442-443.

Kumar et al(2001). " Science instrution for students with visual imparements", *Clearinghouse for Science, Mathematics and Envirometal Education,*Ohio Pg 1 -2

Kumar *et al,* (2001). "Science for students with visual impairment. Teaching suggestions and policy implications for secondary Educators". *Electonic Journal of Science Education, SouthWestern University.*

Langley (1996) Daily life handbook M.C Children with Visial Impairments. *A parents Guide USA Woodbine House*

Laveck & Lourmint (1993). "Idendependent Living Series. A curriculum with adaptations for students with visual impairment".

Lee A., (2009**)**. " An overview of the Kenyan Education System. Issues and obstacles to learning". *The association of universities and colledges of Canada. Canadian International Development Agency.*

Levack N., (1994), Low vision – A resource guide with adaptations for students with visual impairement**.** *Texas School for the Blind and Visually Impaired.*

Littedyke M., (2002)**,** Primary children's views on science and enviromental issues. Examples of enviromental cogitive and moral development**.** *Paper presented at the European Conference on Education Research University of Lisbon.*

Lunney D., (1995) "Assistive technology in the science laboratory. A talking laboratory work station for visually impaired science students". *Information Technology and Disabilities E Journal 2(1).*

Lynch (2011**)** . "Inclusive Education Practices in Kenya. Evidencing practice of Intinerant Teachers who work with children with Visual impairement in local mainstream schools". *International Journal of Education Development, 31(5) 478 – 488.*

Lyndon & McGraw (1973) Concept development for visually handicapped children. *American Foundation for the blind***.**

Mallory (2008**).** Reading strategies for students with Visual Impairement. A classroom Teachers Guide Special Education Technology**.** *British Columbia a provincial resource programm of the BC Ministry of Education.*

Mathew D., (2000). Teachers Manual for Adaptaing Science Experiment for Blind and Visually Impaired Students. *Visual Impairement Knowledge centre, Synsentration storstroms Amt, Woreester Polytechnic Institute.*

MCCarthy C., (2005) "Effects of thematic based hands on science teaching verses textbook approach for students with disabilities*." Journal of Research in Science Teaching 42, 245 – 263.*

Mcleod S., (2011**),** Albert Bandara**,** Social Leaarning Theory. Simple Psychology.

Mehmet & Yorek (2009) "Teaching Science to visually impaired students" *Dukuz Eyliil University Department of Secondary Science and Mathematics Education.*

Michael L., (2001) "Examining perceptions of online Text Size and Typeface Legibility for Older Males and Females". *Proceeding of the 6th Annual International Conference on*

Print ISSN: ISSN 2054-6297, Online ISSN: ISSN 2054-6300

Industrial Engineering – Theory, Applications and Practice San Francisco, CA, USA November 18-20 -2001.

Milsom (2002**).** "Student with disabilities School counselor involvement and preparation". *Proffesional school counseling* 331 – 338

Minish & Omollo(2007 **). "**Secondary Physics. A practical approach", *KLB.pp 2o-22*Ministry of Education(1995) "How to handle children with special needs*", Guidelines for teachers, parents and all others.*

Munya J., (2002). The aims of special education schools and units in Kenya. A survey of teachers . *European Journal of Special Needs Education 17(3), 229 – 239.*

Munyi M., 2012 "Past and Present perceptions towards Disability.A Historical perspective" *The Society for Disability Studies*

Mutua & Dimitror (2001**)**. Prediction of school enrolment of children with intellectual disabilities in Kenya. The role of parents expectations, beliefs and education. *International Journal of Disability, Development and Education 48(2) 179 – 191.*

Mwamba D.,(2000) *International Special Conference 2000.*

Ndurumo M.,(1993) Development consequences and intervention,Nairobi Longman

Ngozi & Norman(2000) Factors influencing curriculum development in high education.

Oerman & Lindgren (1995**)** An educational programm effects on students atitudes toward people with disabilities. *1 year following. Rehabilitation Nursery 20 (1) 6 – 10.*

Oketch A., (2009). Special Education in Kenya, evaluation or revolution comparison with the British system of special education. *A thesis submitted to the department to the department of curriculum and instruction and the faculty of the Graduate School of Wichita State University in partial fullfillment of the requirement for the degree of Masters of Education.*

Osbone & Freyberg (1992**).** Learning " In Science". The implications of children's science**"** *Heinemarn Education.*

Penny & Maray (2001) "Effective classroom Adaptation for students with Visual Impairement". *18th International Seating Symposium, Vancouver, British Columbia Canada.*

Praisner C., (2003) "Attitude of elementary school principles toward inclusion of students with disabilities" . *exceptional children*

Regular schools *Research Project in Diploma in Technical and Vocational Education. Harare: UNESCO.*

Republic of Kenya(2009) "The National Special Needs Education Policy Framework", *Ministry of Education.*

Ross & Robinson(2000). "Social studies and Science" *(Eds) Foundation of education, second edition Vol II.*

Rukwaro R.,(2001). "The education concept of low vision intervention, the kenyan model",*Kenya Institute of Special Education,* No 25 Pg 1 - 4

Scholl G., (1986) " Foundation of education for blind and visually handicapped children and youth – Theory and practice. *American Foundation for the blind Inc, New York page 1 – 30*

Selma R.,(2001). "Adaptation assessment of Young Children with Visual Impairement". *The British Journal of Visual Impairement Vol 29(2) 93 – 112.*

Stefanich and Norman (1996**).** "Teaching science to students with disabilities.Experiences and perceptions of classroom teachers and science education*". A special Publication of the Association for the Education of Teachers in Science.*

Stourt K.,(2001), Special education inclusion. Wiscousia educational association council.

Print ISSN: ISSN 2054-6297, Online ISSN: ISSN 2054-6300

Tiffeny & Koehler (2008) "Teaching science to students with visual impairements**"** *the Ohio State University.*

Tiffey & Koehier (2008), "Teaching Science to students with Visual impairment". *The Ohio United States University.*

Tores &Corn (1976). " When will a visualy impaired handicap child in your classroom**",** *America Foundation for the Blind***,** New York Pg 1 – 20

Torlin C., (2001**)** - Inclusion: Identifying potential stressors for regular class teachers *Educational Research 43 – 235 – 245.*

Turnbull (2002**)** "Exceprional lives, special education in todays school*". (3rd ed) upper saddle River NJ: Merill.*

Verweyea & Hyvarinen,(1995). "The impact of low vision project – kenya in the education of visually imparedchildren",Retrived on August 10th, 2009 from http://ww.lea.test.sgis.fi/en/assesmnet/kenya.html

Wagner B., (1995**)"** Measurement for students who are visually impaired*" In Mehmet and Yorek. Teaching Science to Visually Impaired students***,** *DuKuz Eyliil University Tzmin 35160 Turkey.*

Wamochu K (2008). Development of a guidance program for students with special education needs in Kenya. A story on personal orientation**.** *British Journal of Special Education 35(4) 221 -22.*

West Virginia University (2004) Strategies for teaching students with vision impairment.

WHO 1992**,** Managemant of low vision in children, Report of WHO consultation Bangkork, 23 – 24 July, 1992. *Hosted by the International Council for Education of the visuallyhandicapped children***.**Wikipedia **–** the free encyclopidia.

Winzer M.,(2006) "confronting difference on excusion through the history of special education". *the sage handbooks of special education 2006 SAGE Publication pp 20 –* 30.

Yiannoula A., (2012). "Children's who are Blind Voices concerning science. Primary

Zindi F., (1997) Special Education in Africa. Mogoditshau Bostrnand. *Tasalls Publishing*.

Print ISSN: ISSN 2054-6297, Online ISSN: ISSN 2054-6300