Original Research Article

The effectiveness of reading medium to pupils with albinism: A comparative study between print and Braille medium use in inclusive Primary Schools in Tanga and Arusha Regions

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The study sought to determine the effectiveness of reading medium to pupils with albinism by comparing Print and Braille medium use in inclusive primary schools in Tanga and Arusha Regions. This study used the embedded experimental design. Vision test (vision screening) and testing reading speed were used to collect information from respondents and data were analyzed using the t-test. Findings revealed that most of the pupils with albinism, who were given Braille, could be able to read normal print but they have been exposed early to Braille. Findings further indicated that visual acuity for those who were tested using print medium varied among them. Findings revealed that pupils using print media had the highest mean score (3.9583) which denotes a very high speed of reading for albinism pupils. Those who read through the Braille media by their eyes and not by touching had the mean score of (2.8500) which denotes high speed yet lower than that of the first group of pupils who read through the print medium. Findings further revealed that pupils who were accustomed to Braille reading but during the time of data analysis were given opportunity to read through the print media had the lowest mean score of (1.7000) which is in the category of low speed. The results has shown that, print reading medium could be the best alternative for pupils with albinism because pupils managed to read in the high speed in relation to Braille media which has very small details or raised dot compared to print Media. The study recommends that special attention must be given in assessing the needs of the student with albinism in relation to appropriate reading medium. It was recommended that print media could be the best alternative for pupils with albinism. All vision specialists including teachers teaching pupils with albinism should not expose pupils with albinism to read Braille before having common agreement on reading medium.

Keywords: Reading medium, pupils with albinism, print and Braille medium, inclusive primary schools, Tanga, Arusha

INTRODUCTION

Children with albinism face several challenges and one of them is low vision and visual disturbances which face even other students in regular classroom. Having low vision or visual disturbances, which are normal conditions for children with albinism, does not mean that

albino children should attend special needs educational school as they can significantly benefit in inclusive classroom (Ero, 2014) If reading medium for pupils with albinism should be selected effectively these pupils will learn and perform in all activities including performing

well final examinations.

Wilhelmsen et al. (2021) commented that, pupils with albinism have visual problem which influence their learning, and social-emotional state. Due to nystagmus, low Visual Acuity (VA), strabismus and photophobia, pupils may experience a variety of vision challenges in the classroom, such as glare to light and challenges with reading and taking notes from the blackboard or textbook.

Lane, (2005) defined reading as the most complex and interesting skill that has evolved in the pupil's development. It involves a series of steps and stages of visual processing, sensorimotor coordination and brain and language processes that enhance pupils to read fluently. Reading is a very complex important task for the majority of different school activities and the ability to read is very closely related to visual characteristics that are assessed during visual assessment and screening. According to Jhetam and Mashige (2018), vision is the sensory modality that gives information about the environment around. Vision helps in alerting the presence of helpful as well as dangerous elements in the environment for example when a bicycle turns against a person or when accident occurs etc. Learning can take place by seeing things, moving freely in the environment, locating the source of sound, reaching to object, combining the shape, color and function of things. According to Nawvi and Persha (2004), vision is the master of all senses or is the ability to resolve fine details. Measuring vision acuity normally involves a chart with letters or symbols. There are vision functions which are the most important in understanding the spectrum of visual function among those with impaired vision.

Some visually impaired students including those with albinism may benefit most from learning to use print, others from use Braille, while other students may benefit from using both print and Braille (Lusk and Schwartz, 2016). However, there have been some controversial debates regarding reading materials for children with albinism. For instance, Lynch, Lund and Massah (2014) found that children with albinism have visual related problems including poor visual acuity thus they need special learning materials. On the other hand, Thurston (2014) revealed that even though children with albinism have challenges related to vision, it's not that they are all need Braille materials rather they need to be supported according to student's needs.

Specifically, there have been several studies conducted worldwide on effectiveness of reading medium to pupils with albinism by comparing print and Braille medium use in inclusive primary schools. USA and European countries, believe that mostly albinism in human being affects vision in which it lower the ability of an eye to see details but vision could be able to read print materials or text and sometime use assistive devices. These countries were insisting about the importance of conducting visual acuity screening for proper categorization of the one who can use Braille and print. In USA, Ashley (1992) indicated that albinism as any congenital hypopigmentation (lack of pigmentation) can be seen in different animals and

human beings. Albinism in human being, affects the eye in which it reduces visual acuity and nystagmus, and mostly causes moderate to severe visual problems. The study further indicated that most pupils with albinism in US can read different books which are in regular prints although sometimes use low vision devices. The issue of albinisms has been addressed worldwide. In Europe and the United States of America (USA), there are several movements and studies that enabled the changes in perception and treatment of people with albinism. In the USA, for example, The National Organization for Albinism and Hypopigmentation-NOAH (2021) suggested that most students with albinism can participate in general education programs with appropriate support. They acknowledge that each individual can be treated differently because of the variation in visual acuity, needs, abilities and skill levels. They also established that students with albinism may or may not need large prints. In Netherlands, a study done by Bosman et al. (2006) on how low vision affects the reading process quantitatively but not qualitatively reported that pupils are mostly assumed as visually impaired and eligible for educational support if their functional vision is less than 3/10 or their visual field is less than 30 degrees. In that case a pupil is unable to read print and must be directed to read Braille and he/she considered to be blind. Also, if a pupil has reduced visual acuity or limited visual field the pupil is considered as still able to read print and he/she is considered having low vision.

In Africa, there are several studies on effectiveness of reading medium to pupils with albinism by comparing Print and Braille medium. Some African countries face the challenges of categorizing degree of visual impairment thus determining the appropriate reading medium in relation to their visual acuity. Categorization of pupils with visual impairment should relay on the appropriate assessment and screening of visual acuity for proper decision making and coming up with appropriate intervention. Lund and Massah (2014) in their study on strategies to enhance the educational inclusion of visually impaired children with albinism in Malawi commented that there is a challenge to recognize the visual impairment that always related with albinism or a misconception that this state will lead to complete blindness. After the realization of the concept of visual impairment and the appropriate intervention to such pupils, teaching Braille to pupils with albinism was stopped in Malawi but it is still continuing to be taught in the neighboring countries like Zambia. Franklin et al. (2018) commented that 85% of children with albinism in South Africa were found to have less than 30% vision, even with best optical correction. If not understood or managed appropriately, albinism can have deleterious health and social impacts on the lives of children with the condition.

Mostly, pupils who are visually impaired cannot take science subjects except Biology because subjects like Chemistry, physics and mathematics has some scientific concepts which is difficult to be attended through Braille codes as commented by Karangwa et al. (2015) in their

study on plights of learners with visual impairments in Rwandan science classes reported that although Visually Impaired Students (VIS) including those with albinisms can read by using tactile methods (Braille), this approach becomes useless when it come to the use of graphs, drawings and representation of mathematical and scientific concepts, practical experiments, colors, symbols, graphs, drawings and others. Thus, the study indicated that students with albinism were treated like any other student with visually impaired condition when learning Mathematics and Science.

Reading speed of the particular text has to be determined by the type of materials or reading medium in which the pupil used (Sackstein et al., 2015). The reading speed also has to be determined by the visual acuity of such particular pupil and the ability of the pupil to process the information or the type of materials used in reading. In Tanzania, a study done by Palmer (2017) found that children with albinism usually suffer from vision impairment which is caused by the hypopigmentation of the eyes. Lack hypopigmentation of the eyes results in eye problems like photophobia, nystagmus, astigmatism (blurred vision) a problem with perceptions, squinting and poor eyesight. Having all the above challenges there is a need for selecting an appropriate reading medium for pupils with albinism that will determine their performance. Furthermore, Lancaster University, Coventry University, University of Worcester and standing voice (2018) in their work on Albinism: "An information booklet for teachers in Tanzania" reported that albinism is always associated with poor vision from birth, but not blindness. The degree of visual impairment differs between individuals and is static. This low vision starts at birth but will not worsen with age. Most pupils with albinism can see and read print if the environment is modified to accommodate them and even when allowed to get close enough to the book or any type of print. These pupils do not need to learn Braille.

The above studies have proved the existence of controversial stances on the reading materials for pupils with albinism. The focus of the study is to try to address or find out about the appropriate reading medium for pupils with albinism. In Tanzania the selection of reading media for pupils with albinism is based on imagination or arbitrary categorization with no formalized procedures, screening tools and guidelines to be undertaken in making decisions. In some circumstances, decision on reading medium is decided by a teacher, a pupils or parent without any collection judgment of a learning medium assessment team (Ndung'u, 2011). The experience tells us that most pupils with albinism who receive quality low vision evaluation, prescribed visual devices for acuity and light sensitivity, instruction in the visual skills associated with reading and writing and support for learning to use their vision effectively, are very likely to become efficient print readers and writers. (NOAH, 2017). Despite increasing awareness about pupils with albinism, issues related to their effectiveness of reading medium remain controversy or dilemma which brought barriers to access quality education. Therefore,

this study sought to investigate the effectiveness of reading medium used by pupils with albinism in inclusive primary schools in Tanga and Arusha Region.

Related Literature and Studies

This part presents both the theoretical and the empirical literature review that informed the author in the process of writing.

Theoretical Framework

Cognitive Load Theory

This study was guided by the Cognitive Load Theory (CLD) which refers to the amount of information that working memory can hold at one time since working memory has a limited capacity, instructional methods should avoid overloading it with additional activities that don't directly contribute to learning. This theory was developed by John Sweller in 1988. Cognitive Load Theory is built upon the widely accepted model of human information processing using different materials. This takes a scientific approach to the design of learning materials, so that they present information at a pace and at a level of complexity that the learner can fully understand. Cognitive load" relates to the amount of information that working memory can hold at one time (Ashman, 2017). According to Heick (2017), cognitive load theory provides a general framework and has broad implications for instructional design, by allowing instructional designers to control the conditions of learning within an environment or, more generally, within most instructional materials. Specifically, it provides guidelines that help instructional designers decrease extraneous cognitive load during learning and refocus the learner's attention toward germane or useful materials, thereby increasing germane (schema-related) cognitive load.

Heick (2017) pointed out that the way leaners process information depends on the kind of materials used in reading. Since the reading materials can be either print or Braille, teachers may choose the appropriate materials to fit the needs of the leaner. This theory related to this study since its sake was to determine the effectiveness of reading medium to pupils with albinism by comparing Print and Braille medium use in inclusive primary schools. Therefore, Cognitive Load Theory was useful in understanding the effectiveness of reading medium to pupils with albinism by comparing Print and Braille medium use in two inclusive primary schools in Tanga and Arusha Region.

Empirical Literature Review

Visual Acuity among Pupils with Albinism

A study by Jhetam, Khathutshelo (2018) on cular findings and vision status of learners with oculocutaneous albinism found that most participants (96.3%) had wheat

straw coloured hair and 95.1% had grey irides. All the learners presented with iris-transillumination and an absent foveal reflex and all but one exhibited nystagmus. Esophoria and esotropia represented 72.8% of binocular vision anomalies. Myopic astigmatism was noted in 41.4% of the learners while with the rule astigmatism was predominant (64%). Following optical correction, VA significantly improved from a range of 0.50 to 1.40 logMAR to a range of 0.5 to 1.06 logMAR for distance ($p < 0.05$) and from a range of 0.40 to 1.30 logMAR to a range of 0.30 to 1.08 logMAR for near ($p < 0.05$). In addition, contrast sensitivity improved from a range of 0.48 to 1.92 logCS to a range of 0.88 to 1.92 logCS ($p < 0.05$). However, the reading rate did not show any significant improvement following optical correction ($p > 0.05$). Conclusion: Learners with OCA exhibited various ocular and vision defects which impair visual functions. Their VA and contrast sensitivity could be significantly improved with optical correction; however, their reading rate was not improved.

A study by Summers (2012) on Vision in albinism in South Africa found that both binocular and monocular grating acuity, a special measurement of visual acuity, was reduced 2 to 3 octaves below the norm for ages 6 months to 3 years. Limited data available in the first 6 months of life did not show failure of vision to develop. Grating acuity measurements overestimated eventual recognition acuity. Mean recognition acuity was 20/111 which means the letter or symbol expected to be seen at 20ft are seen on the distance of 111ft. The study was conducted in Croatia by Bowman (2016) to understand the vision problems of children with albinism. The main objective of this research was to analyze prevalence of visual function problems since visual function influences the performance and functioning in everyday tasks and learning in children, the study also analyzed the types of visual function problems in order to obtain information needed to adapt methods, materials and the environment. The study found that albinism is associated with reduced visual acuity, poor accommodation and convergence that affect these students to read fluently.

Jhetam and Mashige (2018) in their study on ocular findings and vision status of learners with oculocutaneous albinism in South Africa pointed out that the majority of participants (96.3%) had wheat straw colored hair and 95.1% had grey irides. All the learners presented with iris-trans illumination and an absent foveal reflex and all but one exhibited nystagmus. Esophoria and esotropia represented 72.8% of binocular vision anomalies. Myopic astigmatism was noted in 41.4% of the learners while with the rule astigmatism was predominant (64%). Following optical correction, VA significantly improved from a range of 0.50 to 1.40 logMAR to a range of 0.5 to 1.06 logMAR for distance ($p < 0.05$) and from a range of 0.40 to 1.30 logMAR to a range of 0.30 to 1.08 logMAR for near ($p < 0.05$). In addition, contrast sensitivity improved from a range of 0.48 to 1.92 logCS to a range of 0.88 to 1.92 logCS ($p < 0.05$). However, the reading rate did not show any significant improvement following optical correction ($p > 0.05$).

Pereira et al. (2016) in their work on profile of albinism with low vision and improvement of visual acuity with the adaptation of optical and / or electronic resources in Brazil reported that unexpected 92% of clients with albinism have visual impairments. Previously, only 30% were known to have visual acuity was the best results. In addition to the problem of acuity, impairments in the visual field, impaired contrast sensibility and impaired binocular functioning were found, as well as impaired visual attention, fixation and following. In 22% of the clients observed, refractive errors were found, and glasses were advised. In this research they proved that people with albinism have vision impairment, but they did not show how to deal with those problems so that people can use their vision effectively.

Carden et al. (2018) examined vision and ametropia in school students with albinism in Canada and found that a Teacher of Visually Impaired (TVI) is a special education teacher with expertise in the education of students with visual impairment. To identify a TVI and to access special education services, parents of a child with albinism should contact their school system. This contact should occur well before kindergarten. De Groot et al. (2019) in their work on the effect of contact interventions on the stigma of people with albinism in Tanzania. The study revealed that students with albinism may or may not need large print. The team should look at the distance and near vision acuities from the eye examination. The TVI should evaluate the student working with various print sizes. Each spring the TVI can gather all books the class will use during the following year and review the books with the student to ascertain which need to be enlarged.

Moreover, Ndomondo (2015) investigated on educating children with albinism in Tanzanian regular secondary schools: challenges and opportunities. The study revealed that students with albinism have visual challenges that can be solved through various ways. The study indicated that computers can be of great use to students with low vision. Students with albinism should begin to learn keyboarding skills with typing readiness computer games as early as kindergarten; they should begin direct instruction in typing or keyboarding as early as possible. Computers with large screen monitors and software for large character display may help older students with writing projects. A CCTV (closed circuit television) may help a student to read charts, graphs, pictures and text. When using a CCTV, try reverse polarity (white letters on black background) to reduce glare. For reading, the student with albinism may use stand magnifiers, hand-held magnifiers, or special reading glasses, such as bifocals with a strong reading lens or telescopic reading lenses clipped over glasses.

Matsuba (2018) on the other hand realized that, both binocular and monocular grating acuity was reduced 2 to 3 octaves below the norm for ages 6 months to 3 years. Limited data available in the first 6 months of life did not show failure of vision to develop. Grating acuity measurements overestimated eventual recognition acuity. Mean recognition acuity was 20/111. A relationship between grating acuity development and presence or

absence of ocular pigment was not found. The study revealed that grating acuity was significantly better for groups I and II under the condition of increased illumination ($P < .03$). For patients with albinism, grating acuity under standard illumination was significantly better than recognition acuity ($P < .001$). According to the Matsuba's study.

For all groups, grating acuity under increased illumination was significantly better than recognition acuity ($P < .01$). Mean recognition acuity in patients with albinism and melanin pigment in their maculas (20/47) was significantly better than measured recognition acuity in Project I ($P < .001$) (2018, p.214).

Ajose et al. (2014) in their study on visual defect in oculocutaneous albinism is not associated with gross structural anomaly in Nigeria revealed that the presenting visual acuity in the better eye of the OCA patients had normal vision (6/6-6/18), majority (60.9%) had moderate visual impairment (6/24-6/60), 4.3% had severe visual impairment (5/60-3/60), while 26.1% were blind (presenting VA of $<3/60$). However, 68.2% of the patients had an improvement of at least one line of Snellen chart in their VA after refraction and/or low vision assessment. Proportion of those with normal vision increased to 27.3%, with no patient in the blindness category after refraction and assessment of best corrected visual acuity (BCVA). Majority (52.3%) of people with albinism had myopic astigmatism, 18.2% had hypermetropic astigmatism, 13.6% myopia, 11.4% hypermetropia, and 4.5% had simple astigmatism. In the myopic group, the minimum error was -1.00 diopters sphere (DS), maximum was -20.00 DS, with an average error of -7.50 DS. In the hypermetropic group, the minimum error was +0.50 DS, maximum was +7.25 DS, with an average of +2.5 DS.

The Reading Speed of Pupils with Albinism when Using Different Reading Medium (Print and Braille)

The reading speed of pupils with albinism differs from one pupil to another depending on the severity of the problem to a particular pupil (Carden et al., 2018). In the study done by Holbrook (2009) on Louis Braille Celebration: Supporting students' literacy through data-driven decision-making and ongoing assessment of achievement indicated that the accurate identification of the appropriate reading medium for a pupil who is blind or visually impaired is crucial in guaranteeing academic performance and personal success. Therefore, when trying to determine the most appropriate reading medium, pupils need to be evaluated and reevaluated individually as they progress, and their literacy needs change. Some visually impaired students may benefit most from learning to use print, others from use Braille, while other students may benefit from using both print and Braille. When studying albinism insight, West (2017) realized that providing a Learning Media Assessment (LMA) for a child with low vision especially those with albinism is one of these practices. An LMA is a method of observing behaviors and existent reading and writing

skills. The study found that reading speed for these children with visual problems is determined by number of factors including the reading environment and reading materials.

Garza et al. (2016) argues that pupils with albinism have visual challenges that cannot be intervened by using glasses and mostly have low vision. The degree of visual impairment varies with the different types of albinism. In order to conclude that, these pupils are blind or having low vision, visual acuity and other screening measures should be conducted and that will determine the appropriate reading medium for these pupils to use in learning process. Pupils with albinism can perform different tasks like reading normal prints, riding a bicycle and some have sufficient vision to drive a car. Lovie-Kitchin, Bevan and Hein (2001) in their study on reading performance in children with low vision from Queensland University established that most children achieved maximum reading rate at print sizes between 2.5 and seven times larger than threshold print size. Maximum reading rate increased significantly with age and near visual acuity. Most children with low vision specifically those with albinism can achieve near normal reading rates with magnification. Age is the strongest predictor of reading rate in children with low vision. They need print sizes well above threshold to achieve maximum reading rate.

Lília et al. (2007) concluded that teachers can remove physical barriers to learning of pupils with albinism. For example, they can make simple adjustments to accommodate the individual learning needs of each pupil. These can be simple changes such as seating a child so that they are not in direct sunlight, allowing them to wear a hat indoors to help protect their eyes, allowing them to move close to the board and making tasks and materials more accessible. Through this, pupils may develop their reading speed. Lynch and Lund (2011) commented that, albinism is mostly connected with poor vision due to involuntary eye movements, light sensitivity and other eye problems like squinting and astigmatism. Visual problems for pupils with albinism are present from birth and lifelong although it is not progressive or not affected more and it varies in severity between individuals.

A study by Palmer (2017) on students who use print, Braille or both indicated that it is common knowledge that large print and assistive devices can help a child with low vision read with more ease. Unfortunately, when enlarged print becomes more of a hindrance than help, it is often brushed aside with excuses or justification due to misconceptions, stigmas, or negative attitudes toward Braille. If large or magnified print is too slow and laborious to read, look at an alternative. If it takes the pupil two or three times longer to complete an assignment compared to their sighted peers, teachers may look at an alternative. If eyestrain, headaches, neck pain, and poor posture become an issue, it is important to look at an alternative. Kelly and Anne (2006) in their study on learning, using print and Braille reported that motivation plays a similar role for the students with low vision who are learning to read print. Reading slowly,

looking closely at print, and experiencing visual fatigue are among the visual difficulties that challenge the enthusiasm of pupils with albinism. The study further indicated that visual functioning that was reported was related to lighting conditions and the ability to see color. Students whose teachers knew their preference or difficulty with certain lighting conditions, such as dim lighting and photophobia were 78 (74.3%) of the 105 students for whom the teachers responded had difficulty working with dim light. Results indicated that 52 (50.5%) of the 103 students for whom the teachers responded had problems with photophobia. Regarding color, 74 (69.8%) of the 106 students for whom the teachers responded had normal color vision.

Kammer (2018) investigated the low-vision rehabilitation and albinism in African Continent revealed that low-vision rehabilitation for individuals with albinism in Africa requires specific attention to trends in visual function that may be different from albinism in other regions in the world. Low-vision specialists must first understand the areas of visual function impacted and then how to maximize or improve these areas specifically to address the characteristics and lifestyles of individuals with albinism in Africa. Franklin et al. (2018) found that students with albinism should receive certain specialized instruction to help them compensate for the visual limitations. The special teacher will instruct them in such skills as keyboarding, listening, orientation and mobility (travel and utilization of the environment), and daily living skills. Keyboarding is important because the student can learn to type assignments, reproduce them in large print for review, and write in a less tiring manner.

Moreover, Nawvi and Persha, (2004) reported that all histograms of slow-phase eye velocity were skewed toward lower velocities, with the peak distribution ranging from 5 to 20 degrees/second. The velocity at the peak of the gamma distribution for each subject was uniformly equal to or below the limiting velocity predicted by the DVA model. The average of the gamma distribution across all subjects corresponded to an upper limit to eye velocity of 17 degrees/second. At this velocity the DVA model predicted visual acuity of 20/50, which is lower than the average visual acuity reported in albinism. The distributions of eye velocity were lower than the limiting eye velocity predicted based on DVA almost 50% of the time. Visual acuity in albinism is limited by macular hypoplasia rather than by slow-phase eye velocity of nystagmus.

When examining teachers can do a great deal to help children with albinism thrive, academic rigor. Ngalomba (2016) indicated that teachers need to know which of their students struggle with low vision and set up seating plans accordingly. It's not helpful to assume that all children can see the board or the teacher equally well from anywhere in the classroom. Teachers should work closely with children's eye specialists to get this seating plan right. Such collaboration helps everyone in the long term. It means that students' eyesight won't deteriorate even faster; optometrists can ensure their patients are getting the best care even outside their treatment rooms

and teachers can be sure their pupils are getting the best shot at learning. Some students will not want to sit up front and should not force to do so, but they should be provided with alternatives. People with albinism have sensitive eyes, so pupils with this condition should not be seated looking neither into direct sunlight nor beneath harsh overhead lights. Ngalomba further found that.

Teachers should also remember that students with albinism might struggle to read from overhead projector screens because of the glare. These students should be allowed to copy the acetate sheets once the teacher is done with each. Font sizes can be also an issue for children who are visually impaired. Teachers must take the time to sit with their students and check whether handouts and texts need to be enlarged (2016, p.84).

Therefore, students with albinism need to be given extra time to finish writing their assignments and schools must ensure that these are presented in large, clear fonts.

Evans and Anie (2018) in their work on the factors affecting the learners with albinism in inclusive schools: theoretical and conceptual frameworks revealed that an albino can be said to be a person with eyebrows and eyelashes are whitish. The person has rapid eye movements or jerking of the eyeball- which is as a result of the condition known as nystagmus caused due to too much light. Dalton (2017) examined assisting the student with albinism in the mainstream classroom indicated that teacher of visually impaired and classroom teacher should work together to identify strategies to assist the student with albinism's visual needs. An optometrist or ophthalmologist experienced in low vision can prescribe specific aids for the individual student. According to Wilhelmsen et al. (2021) as cited in (Jhetam and Mashige, 2020; Karlén and Milestad, 2019), explained that, pupils with albinism are usually provided with magnifiers, low vision equipment, holding materials close to their eyes, given extra time to view materials and improving viewing conditions such as avoiding glare. The authors are in support of using those compensatory techniques to improve vision and for better achievements for pupils with albinism. It may, however, be necessary to further investigate whether other strategies and methods could improve functional vision as well, particularly during reading.

RESEARCH METHODOLOGY

Research Design

The current study used the embedded experimental design. Embedded mixed method research is suitable in cases where single research components may not be sufficient to answer all research questions (Kothari, 2004). This research design was appropriate because the researcher needed to embed a qualitative component within quantitative design as a case of experimental design. This helped the researcher to achieve the main objective of the study.

The current study used the embedded experimental

Table 1 Sample Composition

Category	Method of Testing	School A	School B	Total
Pupils with Albinism	Screening (visual acuity)-Braille users	0	4	4
	Screening (visual acuity)-print users	0	4	4
	Reading test (Braille users)	0	2	2
	Reading test (Prints users)	20	0	20
Total				30

Source: Researcher (2021)

design. Embedded mixed method research is suitable in cases where single research components may not be sufficient to answer all research questions (Kothari, 2004). This research design was appropriate because the researcher needed to embed a qualitative component within quantitative design as a case of experimental design. This helped the researcher to achieve the main objective of the study.

Data Collection Methods

Vision test (vision screening) and testing reading speed were used to collect information from respondents. In terms of vision screening, the researcher used E-Chart or Lea Chart to assess pupils with albinism visual acuity to determine the effectiveness of reading medium by comparing the ability of the eyes to see tiny detail either Print or Braille medium use in inclusive primary schools. On the other hand, to determine reading speed of pupils with albinism when using different reading medium, the researcher provided a sample of text so as students to read it by using both print and Braille. On the other hand, the researcher tested pupils who used both print and Braille media to see which media a pupil is comfortable with in reading. The same text was used to see the reading speed from each media from the same pupil. The text used had the same words, sentences and a short story in consideration of age and level to quantify the results by using those texts. The researcher set time and recorded carefully the time completed by each pupil.

Population

In this study the target population involved students with albinisms studying in either inclusive schools or school with special needs in Tanga and Arusha Region. The targeted population could give information which was used to compare effectiveness of reading media used by pupils with albinism in Tanga and Arusha Region. The total number of students with albinism that were involved in this study is 30 pupils in which 10 pupils with albinism found at Pongwe primary school at Tanga City in Tanga and 20 albino students found at Arusha primary school in Arusha City.

Sampling Techniques

The current study adopted the purposive sampling technique to select respondents in the selected schools.

This technique was applied in the selection of respondents in order to get accurate representative samples according to the nature of information needed in this study. Purposive sampling was used to select the pupils with albinism from both groups those who use print and those use Braille as it is summarized in Table 1.

Data analysis Method

Data were analyzed using the t-test. T-test is a type of inferential statistic used to determine if there is a significant difference between the means of two groups, which may be related in certain features. It is mostly used when the data sets. The t-test is one of many tests used for the purpose of hypothesis testing in statistic (Kenton, 2020). The researcher used the t-test in analyzing data because the study aimed at comparing the effectiveness of reading medium to pupils with albinism by comparing Print and Braille medium and visual acuity of each student in inclusive primary schools. The methods were useful since the researcher needed to test hypothesis. Therefore, the method enabled the researcher to achieve the main objective of the study.

Analysis and Results

Hypothesis Testing

This being a comparative study, it was necessary to test hypotheses on the reading speed of pupils categorized according to various factors. The hypotheses were yielded from the two research questions that guided the study. Each pupil was provided with a set of five pieces of enlarged reading texts and five pieces of Braille text, each set comprising six sentences. The reading speed was determined by seconds and was interpreted as recorded in Table 2.

Research Question I: *Is there a significant difference in reading speed by pupils with albinism when using different reading medium in inclusive primary school?*

This research question sought to detect the difference in reading speed by pupils with albinism categorized according to the medium used to read the same type of text. In this research question, there were three groups of readers: (1) the first group was for those who read using the print media. They were 24 in total. (2) The second group was for those who read through Braille and were 4

Table 2. Reading Speed Interpretation Scale for Standard Three to Seven Pupils

SECONDS USED	MEAN SCORE	INTERPRETATION
1-49	3.50-4.00	Very high speed
50-99	2.50-3.49	High speed
100-149	1.50-2.49	Low speed
150-199	1.00-1.49	Very low speed

Table 3. Comparison of Reading Speed by Type of Media

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Print	24	3.9583	.20412	.04167	3.8721	4.0445	3.00	4.00
Braille	4	2.8500	.66081	.33040	1.7985	3.9015	2.40	3.80
Braille and Print	2	1.7000	.98995	.70000	-7.1943	10.5943	1.00	2.40
Total	30	3.6600	.73560	.13430	3.3853	3.9347	1.00	4.00

Table 4. Analyses of Variance in Reading by Type of Media

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12.444	2	6.222	51.716	.000
Within Groups	3.248	27	.120		
Total	15.692	29			

in number. (3) The third group, on the other hand, was for those who were accustomed to Braille media but were given opportunity to read using the print media. It had two respondents. Therefore, the total number of all respondents was 30. (4) The fourth group was for school A and B comparison on the reading speed for pupils with albinism were categorized according to school A which was a boarding, English medium school and which provided material support and school B which was a non-English medium and without material support to the pupils

This research question called for the testing of a null hypothesis which stated: there is no significant difference in reading speed by pupils with albinism when using different reading medium in inclusive primary school.

The hypothesis was tested using the Analysis of Variance as seen in Table 2 and 3. Results in table 3 indicate the mean score of respondents in different reading media.

The table shows that those using print media had the highest mean score (3.9583) which denotes a very high speed of reading. While it is believed by some scholars that people with albinism can best read through Braille due to their sight challenges (Palmer, 2017; Lynch, Lund & Massah, 2014), these results proved otherwise as this category of readers performed better than those who read through Braille. Therefore, print media could be the best alternative for people with albinism (Thurston, 2014).

The table further indicates that those who read through the Braille media had the mean score of 2.8500 which denotes high speed yet lower than that of the first group of pupils who read through the print media. (Wilhelmsen,

et al., 2021). The third group is for those who were accustomed to Braille reading but during the time of data analysis were given opportunity to read through the print media. These had the lowest mean score of 1.7000 which is in the category of low speed. This suggests that people with albinism who are exclusively accustomed to braille can still make it to read through print media, something which is a positive ingredient in inclusive education. In order for them to feel the sense of being included, it is therefore necessary to be taught to read through print media which has produced the best results.

The analysis of Variance in Table 4 further indicates the Sig of .000 which is less than the critical value indicating that the mean score difference is significant, and therefore, the null hypothesis which stated: *there is no significant difference in reading speed by pupils with albinism when using different reading medium in inclusive primary school*, is rejected. Therefore, print is the best media for good results in reading speed by pupils with albinism.

These findings relate to those of Palmer (2017) who pointed out that students who use print, Braille or both indicated that it is common knowledge that large print and assistive devices can help a child with low vision read with more ease. Unfortunately, when enlarged print becomes more of a hindrance than help, it is often brushed aside with excuses or justification due to misconceptions, stigmas, or negative attitudes toward Braille. Moreover, Franklin et al. (2018) found that students with albinism should receive certain specialized instruction to help them compensate for the visual limitations. The study indicated that before they are given

Table 5. Comparison in Reading Speed between School A and B

	SCHOOL	N	Mean	Std. Deviation	Std. Error Mean
ALLCASES	School B	10	2.9800	.98635	.31191
	School A	20	4.0000	.00000	.00000

Table 6: Independent Sample t-test between School A and School B

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% C.I. of the Difference	
									Lower	Upper
ALLCASES	Equal variances assumed	42.503	.000	-4.710	28	.000	-1.02000	.21658	-1.46365	-.57635
	Equal variances not assumed			-3.270	9.000	.010	-1.02000	.31191	-1.72559	-.31441

***C. I = Confidence interval*

braille to read, they need to be given print media and other specialized instructions. The special teacher will instruct them in such skills as keyboarding, listening, orientation and mobility (travel and utilization of the environment), and daily living skills.

The study tried to compare school A and B in which school A was an English medium school and non-English medium school in relation to the provision of material support and assistive devices as an intervening factor in enhancing the reading speed of pupils with albinism. Therefore, the study come up with the question,

Is there a significant difference in reading speed by pupils with albinism categorized according to school A which was a boarding, English medium school and which provided material support and school B which was a non-English medium and without material support to the pupils?

This research question sought to establish whether English medium status and provision of material support would be an intervening factor in enhancing the reading speed of pupils with albinism. The research question called for testing of a null hypothesis which stated: *there is no significant difference in reading speed by pupils with albinism categorized according to school A which was a boarding, English medium school and which provided material support and school B which was a non-English medium and without material support to the pupils?*

The hypothesis was tested through t test as indicated in Table 4 and Table 5. As seen in Table 4, pupils from School B, the English Medium School, which also provided some material support, scored the mean of 4.000 which was perfect under the category of very high speed while pupils from School A, a non-English medium and which also did not provide material support, had the mean score of 2.9800 which is a high speed but lower than that of School B.

From Table 6, the Sig of .010 which is lower than the critical value indicates that the mean difference is significant whereby pupils from the English medium school which also provided material support significantly

scored higher than pupils from School A. The null hypothesis is therefore rejected. This suggests that nature of school and provision of material support, apart from the type of media used for reading, significantly determined the reading speed of pupils with albinism. Therefore, it is necessary to support the learners with albinism with such items like reading glasses, caps etc. in order to enhance their reading speed (Lília et al., 2007; Bowman, 2016). For instance, when studying albinism insight, West (2017) realized that providing a Learning Media Assessment (LMA) for a child with low vision especially those with albinism is one of the best practices. An LMA is a method of observing behaviors and existent reading and writing skills. The study found that reading speed for these children with visual problems is determined by number of factors including the reading environment and reading materials.

Research Question II: *Is there any significant difference in the visual acuity among pupils with albinism in relation to print and Braille reading medium in inclusive primary schools?*

Table 7 and 8 indicate respondents of various classroom levels who were included in the study, 8 pupils from one inclusive primary school in Tanga were tested for the purpose of determining their visual acuity (VA) in relation to reading speed. Two groups were tested, one groups comprises 4 albinism pupils who use Print as their reading medium and the second groups had 4 Albinism pupils who used Braille reading medium in which pupils read such braille codes not by touching or exploration but by using their eyes as print medium users. All respondents were the ones who tested on reading medium in the first research question. Therefore, the research objectives and research question were to consider the relationship between reading speed and the pupils' visual acuity. How visual acuity could complement with reading speed for pupils with albinism in inclusive

Table 7. The Print reading medium respondent who tested Visual acuity

PRINT MEDIUM USERS						
NEAR			DISTANCE			
	OD (Right Eye)	OS (Left Eye)	OU (Both Eyes)	OD (Right Eye)	OS (Left Eye)	OU (Both Eyes)
1	0.2	0.25	0.25	0.24	0.23	0.32
2	0.21	0.14	0.2	0.14	0.16	0.2
3	0.24	0.28	0.32	0.18	0.2	0.21
4	0.2	0.25	0.25	0	0	0.32

Table 8. The Braille reading medium respondent who tested Visual acuity

BRAILLE MEDIUM USERS						
NEAR (VISUAL ACUITY)			DISTANCE (VISUAL ACUITY)			
	OD (Right Eye)	OS (Left Eye)	OU (Both Eyes)	OD (Right Eye)	OS (Left Eye)	OU (Both Eyes)
21	0.5	0.32	0.4	0.5	0.32	0.63
22	0.25	0	0.16	0.1	0	0.16
23	0.2	0.25	0.25	0.16	0.2	0.16
24	0	0	0.2	0	0	0.2

classroom. The test results presented here are: VA-screening at 40 cm and 3 m using LEA® charts with 5 symbols per row (LEA-Test Ltd., 2018).

Table 7 indicates that pupils who were using print medium and who was tested visual acuity in which Pupils 1 tested VA near which shown that the pupils can read 0.2 for right eye, 0.25 for left eye while both eyes read 0.25. The pupil also was able to read or show Lea Symbols at Distance as follows right eye 0.24, left eye 0.23 while both eyes read 0.32 which means both eyes work at least together. This pupil will be very difficult to read 40 cm near as well as 3m distance because albinism pupils always have low vision therefore, they read better if the document will be very closer to their eyes. Pupil number 2 the ability of the eye to see detail for near, VA for right eye is 0.21, left eye 0.14 while both eyes read 0.20. VA distance was 0.14 for right eye and left eye was 0.16 while both eye VA was 0.2 which was almost the same with near distance. The test shown that pupils need the document to be closer to them in order to read tiny details and sometimes even the consideration of other supporting materials or equipment.

Pupil number 3, the ability of the eye to see detail for near, VA for right eye is 0.24, left eye 0.28 while both eyes read 0.32. VA distance was 0.18 for right eye and left eye was 0.20 while both eye VA was 0.21. The results shown that VA for near is better than VA for Distance, but they still need more support and care to make them read print clearly. As shown in the Table 7, Pupil number 4, the ability of the eye to see detail for near, VA for right eye is 0.20, left eye 0.25 while both eyes read 0.25. VA distance was 0.0 for right eye and left eye was 0.0 while both eye VA was 0.32. The results shown that VA for distance is poor (right and left eye), but both eyes seem to be better. Pupils with albinism who do not experience nystagmus mostly they have a distance VA between 1.0 and 0.4 (Wolf

et al., 2005). This is much better than the distance VA of our subjects who have a moderate visual impairment, a VA between 0.3 - 0.0, both at distance and at near pursuant to the International Classification of Diseases (ICD-11, World Health Organization, 2018). The results proving that VA for pupils with albinism is poor and these pupils need special care in terms of color consideration, lighting proper positioning and special equipment that help them to read and learn well in inclusive classroom.

Table 8 indicates that pupils, who use Braille reading medium, used their eyes to read Braille and who tested VA. Pupil 21, the ability of the eye to see detail for near, the standardized Lea symbols shown that the pupils was able to read 0.5 for right eye, 0.32 for left eye while both eyes read 0.40. The pupil also was able to read or show Lea Symbols at Distance as follows right eye 0.50, left eye 0.32 while both eyes read 0.63 which means VA at distance was better compared to near distance. These results indicate that this pupil could be able to read normal print and not Braille. Pupil number 22 the ability of the eye to see detail for near, VA for right eye is 0.25, left eye 0.0 while both eyes read 0.16. VA distance was 0.1 for right eye and left eye was 0.0 while both eye VA was 0.16 which was almost the same with near distance. The results shown that VA for both near and distance was poor which could make this pupil to struggle when reading using Braille medium using their eyes. The 40cm near test seems to be distance for some pupils with albinism, therefore these pupils are mostly need the reading materials to be closer and having some assistive reading materials and consideration of color contrast, lighting and classroom positioning.

Pupil number 23 the ability of the eye to see detail for near, VA was recorded as follows; for right eye is 0.20, left eye 0.25 while both eyes read 0.35. VA distance was 0.16 for right eye and left eye was 0.20 while both eye VA was

Table 9. Comparisons between Print Medium and Braille Medium Users' Standard III Albino Pupils

VA FOR PRINT MEDIUM				BRAILLE MEDIUM			
PUPILS NO.1	Od	Os	Ou	PUPILS NO. 21	Od	Os	Ou
Near VA	0.20	0.25	0.25	Near VA	0.5	0.32	0.40
Distance VA	0.24	0.23	0.32	Distance VA	0.5	0.32	0.63

Table 10. Comparison between Print Medium and Braille Medium Users Standard IV Albino Pupils

VA FOR PRINT MEDIUM				BRAILLE MEDIUM			
Pupils No.2	Od	Os	Ou	Pupils No. 22	Od	Os	Ou
Near VA	0.21	0.14	0.20	Near VA	0.25	0	0.16
Distance VA	0.14	0.16	0.20	Distance VA	0.1	0	0.16

Table 11. Comparison between Print Medium and Braille Medium Users Standard III Albino Pupils

VA FOR PRINT MEDIUM				BRAILLE MEDIUM			
Pupils No.3	Od	Os	Ou	Pupils No.23	Od	Os	Ou
Near VA	0.24	0.28	0.32	Near VA	0.20	0.25	0.16
Distance VA	0.18	0.20	0.21	Distance VA	0.16	0.20	0.16

Table 12. Comparison between Print Medium and Braille Medium Users Standard III Albino Pupils

VA FOR PRINT MEDIUM				BRAILLE MEDIUM			
Pupils No.4	Od	Os	Ou	Pupils No.24	Od	Os	Ou
Near VA	0.20	0.25	0.25	Near VA	0.20	0.25	0.16
Distance VA	0	0	0.32	Distance VA	0	0	0.32

0.16. The results shown that VA for near and distance was poor for right and left eye but results for near (both eyes) seems to be better at least which also could not be supportive for pupils. As shown in Table 8, Pupil number 24, the ability of the eye to see detail for near, VA for right eye is 0.0, left eye 0.2 while both eyes read 0.20. VA distance was 0.0 for right eye and left eye was 0.0 while both eyes VA were 0.2. The results shown that VA for near and distance is very poor. Pupils with albinism experience low VA, mostly need to move very closely to the text or read the enlarged text. When reading on a screen or CCTV it is also necessary to regulate the screen lighting, color, contrast, text font size to avoid glare and pain (Presley, 2018).

As shown in Table 9, all of these pupils were in standard three but one used print medium and the other used braille as a reading medium. The near and distance VA of pupil using Braille looked better compared to the pupil using Prints. The pupils using braille seemed to use more time during the reading speed test probably because the pupils were exposed to braille early without using a team of specialist such as eye specialists, special education teachers, parents or guardian, regular teachers etc. to decide the appropriate reading medium in relation to his/her visual acuity. If the vision could be improved through training may the pupils would be able to use print medium.

Table 10 shows that all these pupils were in standard four, one used print medium and the other used braille as

the reading medium in their inclusive classroom. VA for pupil using print medium seemed to be better compared to that used braille. The one used braille, his vision was very weak. The left eye for both near and distance could not be able to see an object. From these results it seems that pupil who used braille medium had big problem compared to those used print media.

Table 11 revealed that, all these pupils with albinism were in standard three, pupil number 3 used print medium and pupil number 7 used braille medium as their reading medium, their visual acuity (VA) for right eye and left eye were almost the same to all two groups but their VA for both eyes for near and distance for braille users was different and their eyes were diverging. The reading test indicated clearly that such pupil used many seconds (time) compared to the one used print medium as a reading medium.

Table 12 presents findings about the comparison between print medium and braille medium users' standard III albino pupils. It was revealed that all pupils were in standard three. Pupil number 4 used print and pupil number 8 used braille as their reading medium. Their visual acuity (VA) for near were almost the same to all two groups which allowed them to read such materials during reading test almost the same seconds (45-50 seconds). VA for distance seemed to be very poor for both groups for right eye and left eye but both eyes were working at least together compared to VA near in which they were not able to read Lea symbols.

DISCUSSIONS

The finding matches with those of Wilhelmsen et al. (2021) who assessed eye movements and selected vision function tests in three pupils with albinism: A case study in Tanzania. The study pointed out that pupils with albinism have visual challenges which influence their educational, social-emotional and later career development. Due to nystagmus, low visual acuity (VA), strabismus and photophobia, pupils may experience a variety of vision-related problems in the school environment, such as glare to light and difficulties with reading and copying written information from the blackboard or textbooks. Tanzania has 14 times more people with albinism than most countries in the world and nearly 70% of children with albinism report that their eyesight has a severe negative influence on their school performance. The visual acuity for the screened pupils with albinism ranges from 0 to 063 which is more than the low vision border which is 0 to 1.5 VA, this means that most of the pupils with albinism are able read prints and not Braille.

Conclusions

The findings proved that print reading medium to pupils with albinism using print media had denoted a very high speed of reading the text compared to Braille reading medium in which the reading speed was low. The results proved that print reading medium category performed better than those who read through Braille. Therefore, print media could be the best alternative for people with albinism and exposing them to Braille media in which they use their vision to read and not even through touching in relation Braille media which has very small details or raised dot compared to print Media. Therefore, the visual acuity of the two groups seems to be almost the same despite of some slight differences which could not force pupils with albinism to use Braille texts. In comparison, the albino pupils have high reading speed when using prints than when using Braille.

Recommendations

The study recommends that all teachers working with pupils with albinism should be trained on vision screening and assessment which is necessary for classroom and material adaptations as well as making decision on the appropriate reading medium. It is of great importance that teachers and other professionals carefully listen to the pupils with albinism descriptions of their challenges and their choices since they are highly individual. print media could be the best alternative for people with albinism. All vision specialists including teachers teaching pupils with albinism should not expose pupils with albinism to read Braille before having common decision making on reading medium. For pupils with albinism to feel the sense of inclusion, it is necessary to be taught to use the appropriate medium as agreed by

the group of specialists. Moreover, the study recommends that teachers in inclusive schools should work together with the eye specialists in order to test the visual acuity of the pupils thus will help them in making appropriate decisions on the type of the reading medium suitable for a particular pupil. Pupils with albinism have poor visual acuity (VA) as shown by VA test in the study and such results compliment with the International Classification of Diseases (ICD) as stipulated by World Health Organization in 2018 which stated clearly that the cut point number for low vision people, VA reads between 0.5 - 0.1, both at distance and at nearby. Therefore, the vision specialists need to consider such classification for appropriate decision making and right placement for pupils with albinism.

Conflict of interests

The authors declare that there is no conflict of interests regarding the publication of this manuscript.

REFERENCES

- Ajose FO, Awosanya GOG, Adekoya BJ, Jinadu F O, Cole OM, Elebute OH, Ajayi OI, Awoyemi ZA, Akinola RA (2014). Visual Defect in Oculocutaneous Albinism is Not Associated with Gross Structural Anomaly. *J. Clinical & Experimental Dermatol. Res.* 5(4):1-4.
- Carden SM, Fuzzard DR, Kane JX (2018). Vision and ametropia in school students with albinism. Retrieved from <https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1444-0938.2001.tb04958.x>
- Dalton SM (2017). *Assisting the Student with Albinism in the Mainstream Classroom.*
- De Groot T, Meurs P, Jacquet W (2019). The effect of contact interventions on the stigma of people with albinism in Tanzania. *J. Visual Impairment & Blindness*, 113(5):464-469.
- Ero I (2014) *Quick Guide for Teachers and Educators of Persons with Albinism: 4th Edition, Under the Same Sun.*
- Evans MA Anie P (2018). The factors affecting the learners with Albinism in Inclusive Schools: Theoretical and conceptual frameworks. *World Wide J. Multidisciplinary Res. and Development.* 4(10): 50-54
- Franklin A, Lund P, Radbury-Jones C, Taylor J (2018). Children with albinism in African regions: their rights to 'being' and 'doing'. *MC International Health and Human Rights*, 18:2.
- Garza K, Gorman J, Cowan C, Sewell D, & Bachofer C (2016). *A kit Designed to Guide Parents and General Education Teachers in Supporting Students with Albinism in the Classroom.* USA: NOAH .
- Heick T (2017). What Is The Cognitive Load Theory? A Definition For Teachers. <https://www.teachthought.com/learning/cognitive-load-theory-definition-teachers/>
- Jhetam S, Mashige KP (2018). Ocular findings and vision status of learners with oculocutaneous albinism.

- African Vision and Eye Health ISSN: (Online) 2410-1516, (Print) 2413-3183.
- Kammer RL (2018). Low-vision rehabilitation and albinism. In *Albinism in Africa*. Academic Press. 2(1):151-170
- Karangwa E, Iyamuremye D, Muhindakazi A (2015). Plights of learners with Visual Impairments in Rwandan science classes: Evidencing teachers' practice in HVP Gatagara. *Rwandan J. Educ.* 1 (2):19-37.
- Kelly E, Anne L (2006). Learning and Using Print and Braille: A Study of Dual-media Learners, Part 1. *JVIB*. Vol. 100 (10).
- Kothari CR (2004). *Research Methodology*. (Second Edition), New Delhi: New Age International (P) Limited.
- Kumar J (2011). *Research Methodology: A Step-by-Step Guide for Beginners*. London: SAGE
- Lancaster University, Coventry University, University of Worcester and standing voice (2018) *Albinism: An Information Booklet for Teachers in Tanzania* as retrieved from, Albinism-in-africa.com
- Lane KA (2005). *Developing Ocular Motor and Visual Perceptual Skills: An Activity Workbook*. United states: SLACK incorporated.
- Lília MM, Shirlei CM, Lago TDC, Luciane MR (2007). Perfil do albinismo o oculocutâneo no estado da Bahia. *Rev Cir Méd Biol*. 6(1):69-75.
- Lusk K, Schwart TL (2016). Management of Vision Impairment in Children, in Traboulsi Ei, Utz VM, (Eds.) *Practical Management of Pediatric Ocular Disorder and Strabismus: A Case-Based Approach*, (PP-725-734) Springer Science + Business Media, New York.
- Lynch P, Lund P (2011). Education of Children and Young People with Albinism in Malawi. London: Commonwealth Secretariat: Field report for the Commonwealth Secretariat.
- Lynch P, Lund P, Massah B (2014). Identifying strategies to enhance the educational inclusion of visually impaired children with albinism in Malawi. *International J. Educational Development* 39:216-224
- Matsuba A (2018). Visual Acuity for people with Albinism. Faculty of Medicine, The University of British Columbia, Vancouver, BC, Canada.
- Ndomondo E (2015). Educating Children with Albinism in Tanzania Secondary Schools: Challenges and Opportunities. *International J. Education and Research*, 3 (6), 389-400.
- Ngalomba S (2016). Teachers can do a great deal to help children with albinism thrive, oculocutaneous albinism. *African Vision and Eye Health* ISSN: (Online) 2410-1516, (Print) 2413-3183.
- NOAH (2021) Information Bulletin: Assisting Students with Albinism, National Organization for Albinism and Hypopigmentation-NOAH, <https://www.albinism.org>
- Palmer M (2017). Print or Braille? Megan Reads Both. Retrieved from <https://www.nfb.org/sites/www.nfb.org/files/images/nfb/publications/fr/fr28/fr280115.htm>
- Pereira D, Araujo E, Patuzzo F (2016). *Profile of albinism with low vision and Phenomenological Analysis of the Experience of Inclusion and Support in High School for Vision-impaired Students with Albinism*. *International Journal of Disability, Development and Education*, 61:2:108-118,
- Sackstain S, Spark L, Jenkins A, (2015) Are e-books Effective Tool for Learning? Reading Speed and Comprehension: iPad Vs. Paper, *South African J, Education*, Vol. 35 NO. 4
- Schwering MS, Kumar N, Bohrmann D, Msukwa G, Kalua K, Kayange P, & Spitzer M S (2015). Refractive errors, visual impairment, and the use of low-vision devices in albinism in Malawi. *Graefe's Archive for Clinical and Experimental Ophthalmology*, 253(4):655-661.
- Summers, C.G. (2012). Vision in Albinism. *Trans Am Ophthalmol Soc*. 94: 1095-1155.
- Thurston M (2014). They Think They Know what's Best for me": An Interpretative Trustworthiness and Publishing, *European J. General Practice*, 24:1:120-124.
- West M (2017). From the winter edition of Albinism Insight. https://www.albinism.org/wp-content/uploads/2018/02/NOAH_Ed-U_Winter_2017.pdf
- Wilhelmsen GB, Eide MG, & Felder M, (2021). Assessment of eye movements and selected vision function tests in three pupils with albinism: A case study in Tanzania. Accessed from <https://doi.org/10.1177/0264619620986855>.