DIFFiculties faced by pupils with disabilities in the learning of Mathematics at ordinary level: the case of Danhiko secondary school

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PROGRAMME COORDINATOR
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I, Tazviwana Tsungai declare that this project is my original work and affirm that it has not been submitted to this or any other University in support of any application for a degree or any other qualifications.

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I, ____________________________ declare that I have supervised this thesis and am satisfied that it can be submitted to the Faculty of Science Education of Bindura University of Science Education
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I submit for assessment in accordance with the Department’s regulations this project which is my own work and contains 96 pages.

Signature of candidate: ..............................................................

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I have advised and supervised this candidate during the project year. I am certified that to the best of my knowledge and belief this project is the work of the candidate and its factual contents are true.
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DEDICATION

This project is dedicated to my husband, Lazalus Tazwiwana. May I say to him, we will always engage each other when support is needed in all the things we set ourselves to accomplish.
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**ABSTRACT**

Over the past years, there has not been a topic that caused more controversy in special education among teachers, administrators and parents than the concept of inclusion. Inclusion represents the belief or philosophy that students with disabilities should be integrated into the regular education classrooms whether or not they can meet traditional curricular standards or not. The purpose of this study was to examine the difficulties faced by pupils with disabilities in the learning of mathematics. This study included a comprehensive review and critical analysis of research and literature concerning the issue of inclusion, disability and the teaching methods employed by mathematics teachers in inclusive classrooms, and difficulties faced by pupils with disabilities in the learning of mathematics. Four mathematics teachers completed and returned a
researcher-constructed questionnaire and nineteen pupils with disabilities participated in the research, they also completed researcher constructed questionnaires. All mathematics teachers were involved in focus discussion groups and one mathematics teacher was interviewed. Eleven pupils with disabilities participated in individual interviews. In an effort to learn more about the difficulties faced by pupils with disabilities in the learning of mathematics, observations during lessons and document analysis were carried out. The findings of this study indicated that pupils with disabilities face several difficulties in the learning of mathematics. In order to reduce the difficulties faced by pupils with disabilities the researcher gave recommendations to teachers, administrators and the Zimbabwe School Examination Council. These recommendations were designed to assist in implementing an inclusionary program that would benefit everyone’s academic excellence.
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CHAPTER ONE: INTRODUCTION

1.1 Introduction
The learning of mathematics in our secondary schools has always been considered paramount to the development of our country’s economic base and yet a look at the number of pupils passing mathematics at ordinary level reveals an apparent trend of apathy. Inclusive education has been internationally recognised as a philosophy for attaining equity, justice and quality education for all children. A study of the difficulties faced by pupils with disabilities in the learning of mathematics at ordinary level shows that there is need to find ways of increasing quality results for all.

1.2 Background to the problem
That mathematics education is a pre-requisite towards the country’s march towards economic development is obvious. Looking at the performance of pupils with disabilities in mathematics in the Zimbabwe School Examinations for the past five years, the observations were as follows.

<table>
<thead>
<tr>
<th>Year</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of pupils with disabilities who passed mathematics</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

It is a result of these observations that spurred the researcher to carry out this study in order to investigate the difficulties faced by pupils with disabilities in mathematics and suggest ways to rectify them. Mathematics relates to most subjects offered in schools, that shows how important it is, but hardly does one hear any child with disability boasting that mathematics is his or her favourite subject.

argued that poor performance in mathematics can hamper the career prospects of students and create problems in day to day activities. The results of the National Assessment of Education Progress cited in Carpenter, Matthew and Hale (1984), indicated that too many students in the elementary grades failed to acquire sufficient skills in operations and applications of mathematics. According to Hasselbering, Coin and Bransford (1988), these persistent skills deficits, combined with limited fluency of basic fact recall hinder the development of higher level mathematics skills, this compromises subsequent achievement leads in their studies.

Indeed, there are many more who have voiced concern as far as the learning and teaching of mathematics to pupils with disabilities is concerned. Parents, educators and policy makers have shown through research and letters to the press that they are concerned with the negative attitudes teachers, parents and pupils show towards the subject. Faced with such a concern a research study was probably the most appropriate thing to undertake in order to determine the magnitude and cause of the observed problems. The researcher also sought to find out if professional people like teachers could assist resolve the difficulties faced by pupils with disabilities in the learning of mathematics.

As schools are increasingly challenged to serve a diverse student population, the concern is no longer whether to provide inclusive education, but how to implement inclusive education in ways that are both feasible and effective in ensuring success for all children. The appalling state of education being offered to children with disabilities forms the motivation and basis for this study. Without nuanced measures being undertaken to better their education, pupils with disabilities risk being condemned to an imbalanced life in their later years. Richler (2005: 32) cited in Combrinck (2008: 318) noted that lack of education is a life sentence to poverty and exclusion. Education should therefore be a key priority intervention if the situation and future of pupils with disabilities is to be improved. As Tomasevski (2003:32) observed, redressing imbalances in life chances without full recognition of the right to education is impossible. Besides, the fact that every individual can get disabled, as Combrinck (2008: 303) put it disability can be acquired at any point in a person’s life, should be a rallying point for duty-bearers to take steps to address the prevailing gaps in the education for pupils with disabilities.
as well as proactively establishing an environment capable of dealing with any would-be cases of disability.

While there have been several studies on disability-related issues this study merely sought to find the difficulties faced by pupils with disabilities in the learning of mathematics. If we consider the pass rate of pupils with disabilities in mathematics at Danhiko Secondary School we find that either one pupil passes or no one passes at all. This shows that there are certain difficulties faced by pupils with disabilities which affect their performance. It is hoped that the findings of the study will be a valuable tool for policy makers in taking all possible steps to ensure that education offered to pupils with disabilities is meaningful and will contribute to their well-being in society.

A look on the streets shows that there are many people with disabilities who are doing informal jobs like selling juice cards, selling DVDS and others. The researcher assumes that there is lack of formal employment for pupils with disabilities due to lack of required subjects to proceed to higher educational levels and in most cases these pupils do not have ordinary level mathematics. People with disabilities encounter negative social attitudes, particularly in the fields of education, health and justice. Furthermore, there is evidence to suggest that different impairment groups discriminate against each other, and there is discrimination as well within families when there is a disabled family member. Lack of understanding and knowledge about disability, poverty and social exclusion makes some parents with disabled children neglectful of their disabled child’s needs. Broader lack of a basic understanding of child health and development coupled with poverty, makes some parents unwilling or unable to visit those child health services that do exist, which itself is a continuing cause of preventable disablement. Richard Ssewakiryanga states that, parental negligence and failing to address health problems during pregnancy and for children in early years was also blamed for severe and chronic illness in children and contributed to disability in later life.

Poverty associated lifestyles of people with disabilities also forced the researcher to carry out the study in order to find the difficulties faced in the learning of mathematics by pupils with disabilities which will later affect their performance in mathematics and hence their lifestyles.
Poverty is both a cause and consequence of disability, with up to 80% of disabled people experiencing long term poverty. Poverty also affects the families of disabled people disproportionately. The majority of adults and children with disabilities find their chances of going to school, working for a living, enjoying family life and participating as equals in social life are severely restricted, not only because of their impairments but also due to social attitudes, discrimination and exclusion.

According to Silicon and Harter (1985), the impact of disability on pupil’s self-concept, suggests that the study of individual differences can be undertaken most readily in situations where such differences are maximised. One way of doing this is by considering the impact of disability upon the person’s self concept. Pupils with disabilities look down upon themselves thinking that they cannot do anything worthwhile. In mathematics learning, if they label themselves negatively towards the study of the subject, they will not work hard even if they can perform better. By studying pupils who have different kinds and level of disabilities and comparing their self concept with those who do not have such disability, the impact of individual differences upon notions of self can be more effective. According to Silicon and Harter (1985), with respect to pupils with physical disabilities, they see themselves as performing less well than did their typically developing peers. Therefore, self concept levels of pupils with disabilities may cause them to have difficulties in the learning of mathematics. This assumption forced the researcher to look for the difficulties faced by pupils with disabilities in the learning of mathematics.

Pupils with disabilities are often considered as the last option in schools, families and churches after those who are able bodied. In schools, families, churches and everywhere people will consider them after they have considered those who are able bodied. Regardless of whether the potential beneficiary is disabled or not, education carries the same value and importance. Bruns (2003: 28) noted that,

*education provides people with the essential and individual power to reflect, make better choices, seek a voice in society and enjoy a better life. Education and particularly primary education, also promotes achievement of all the other Millennium Development Goals: poverty reduction, gender equity, child health, maternal health, lower HIV/AIDS and other communicable diseases,*
Human rights are framed taking note of the fact that no human being should be discriminated against in the enjoyment of human rights. The relevance of education as espoused by Bruns (2003), should therefore be enjoyed by a person with disability as much as it should for a person without a disability. Talking of hearing impaired pupils, sometimes their presence is not even recognised because of the nature of their disability. Considering education system, the difficulties faced by pupils with disabilities are not recognised. The researcher is concerned with the difficulties faced by pupils with disabilities in the learning of mathematics at ordinary level.

Parents of disabled pupils do not value the importance of educating pupils with disabilities, instead they take their education as a place to keep them busy until God takes them. Usually parents of disabled pupils get rid of them by taking them to boarding schools and have less burdens in families. Therefore pupils with disabilities face many difficulties, and in this research, the researcher concentrated on the difficulties they face in the learning of mathematics at ordinary level. Attitudes like behaviour from guardians, parents, family members, neighbours and friends, affect the whole life of the pupil and even the academic performance. The researcher observed that pupils with disabilities often look down upon themselves and therefore they lack competition with those without any disability. This lack of competition affects the academic performance of pupils and often affects performance in mathematics. This poor performance is due to difficulties faced by pupils with disabilities in the learning of mathematics.

1.3 Statement of the problem
Pupils living with disabilities face several difficulties in the learning of mathematics and these impact on the overall performance in other subjects like science, geography, agriculture and accounts.

1.4 Overall aim of the study
To investigate the difficulties faced by pupils with disabilities in the learning of mathematics at ordinary level.

1.5 Objectives
This study addressed five main objectives. They were as follows:
1.5.1 To identify challenges faced by pupils with disabilities in the learning of mathematics.
1.5.2 To suggest possible solutions to the learning problems for the pupils with disabilities.
1.5.3 To suggest new strategies in the teaching and learning of mathematics by pupils with disabilities.
1.5.4 To recommend methods that could be used to teach pupils with disabilities so that they find mathematics as an interesting subject at school.
1.5.5 To identify factors which contribute towards poor performance in mathematics by pupils with disabilities at Danhiko Secondary School.

1.6 Main research question
What are the major difficulties faced by pupils with disabilities in the learning of mathematics at ordinary level?

1.6.1 Sub-questions
1.6.1.1 Are the teaching methods employed by mathematics teachers responsible for the difficulties faced by pupils with disabilities?
1.6.1.2 Is the amount of the work given and frequency of marking by teachers adequate to enable concepts to be mastered by students with disabilities?
1.6.1.3 Does the previous pass rate in mathematics by pupils living with disabilities frighten the pupils in mathematics?
1.6.1.4 Are there adequate instructional materials at Danhiko secondary school for the effective teaching of mathematics to pupils living with disabilities?
1.6.1.5 Which topics do most pupils with disabilities find difficulties?

1.7 Significance of the study
The study is important since it sought to find the difficulties faced by pupils with disabilities in the learning of mathematics at ordinary level. It is hoped that the difficulties found will then form the basis of recommendations, therefore the study will recommend intervention strategies. It is assumed that the results of the study will also be of much use to the Heads of inclusive Secondary Schools. Once they are made aware of the difficulties faced by pupils with disabilities in the learning of mathematics, they are likely to put into place measures that will help to motivate teachers and students to perform better in the subject. It is hoped that mathematics
teachers will be able to employ teaching methods that will make pupils with disabilities like mathematics. This will not only enable more students with disabilities to do mathematics but it will bring joy and satisfaction to the teachers involved.

Recommendations may also facilitate policy makers in the formulation of a relevant curriculum for pupils with disabilities. Perhaps relevant concepts that tally with today’s technological advances may be added, should the researcher find the difficulties having anything to do with the tedious and absolute arithmetical calculations of today’s mathematics. It is hoped that the nation shall benefit because students with disabilities shall become motivated to pursue mathematics education as a result of the study. Consequently, the study will make a major contribution to the economic and technological development of the nation. The general public may also benefit. For instance, more and more pupils with disabilities will pass mathematics at ordinary level. It is also hoped that more people will be able to appreciate the necessity for mathematics education. Parents may in turn be involved in motivating their children into liking the subject.

1.8 Ethical considerations

Before leaving for field data collection, the researcher secured a letter from Bindura University of Science Education, which introduced her to the various respondents the researcher interacted with. Additionally, the researcher also secured recommendation from the Ministry of Education, Sports, Arts and Culture as well as permission to interview Danhiko Secondary School teachers and pupils with disabilities. The researcher also sought permission from the Harare Province and from the Epworth-Mabvuku/Tafara district to carry out the research in their province and district respectively. Also, permission was sought from Danhiko Secondary School headmaster. All letters are attached. Also, taking into consideration ethical concerns of conducting this study, verbal consent was obtained from respondents not to mention their names in the research.

1.9 Assumptions

In order to be possible to effectively carry out the research, there were assumptions which were made. Firstly it was assumed that ordinary level pupils with disabilities perform more poorly in mathematics than in any other subject. It was also assumed that the opportunity to learn mathematics was the same as in other subjects. The timetabled periods per week for mathematics were the same and in most cases more than in most other subjects. Most importantly, it was assumed that pupils with disabilities face difficulties in mathematics due to their disabilities.
1.10 Limitations
Due to time shortage, the study was carried out at one inclusive Secondary school in the Harare province that is Danhiko Secondary School. At Danhiko Secondary School there are no modern gargets for teaching mathematics such as the use of computers, overhead projectors. Questionnaires lack control, for example the questionnaire may not be completed by the intended respondent, the researcher emphasised to respondents the importance of the study and why the chosen respondents should be the ones to complete the questionnaires.

1.11 Delimitations
The study merely sought to find the possible difficulties faced by pupils with disabilities in the learning of mathematics at ordinary level at Danhiko Secondary School; an inclusive secondary school in the Harare province. The data was sourced from ordinary level mathematics teachers and pupils with disabilities at Danhiko Secondary School in the Epworth-Mabvuku/Tafara district of the Harare province. The researcher selected Danhiko Secondary School because that is where the researcher works. That gave her enough time to carry out the investigations without travelling long distances. The researcher also had worked with pupils with disabilities at Danhiko so it was easy to discuss issues concerning mathematics as the researcher is the head of the mathematics department at the school.

1.12 Definition of terms

1.12.1 Difficulties: According to Hawker (2006), difficulties are problems, or obstacles, or an objection. According to Wiley (2010), difficulties are troubles, or distresses, or a cause of. In this research, difficulties are problems or challenges.

1.12.2 Disability: According to Hawker (2006), disability is a physical or mental condition that restricts movements, senses or activities. According to Stone (1984), disability is a condition or function judged to be significantly impaired relative to the usual standard of an individual or group. Disability is a term used to refer to individual functioning, including physical impairment, sensory impairment, cognitive impairment, intellectual impairment, mental illness and various types of chronic disease. According to Garnett (1998), disability is conceptualised as being
multidimensional experience for the person involved. There may be effects on organs or body parts and there may be effects on a person’s participation in areas of life. In this research, disability is taken to be an umbrella term, covering impairments, activity limitations and participation restrictions.

1.12.3 Learning: According to Hawker (2006), learning is becoming aware of something through observing or hearing about it or to gain knowledge or skills through study or experience. This is the same definition which is used in this research.

1.12.4 Mathematics: According to Hawker (2006), mathematics is a branch of science concerned with numbers, quantities and space. According to Houghton (2009), mathematics is the study of the measurement, properties and relationships of quantities and sets, using numbers and symbols. In this research, mathematics is a group of related sciences, including algebra, geometry and calculus concerned with the study of number, quantity, shape and space and their interrelationships by using a specialised notation.

1.13 Summary
This chapter looked at the background of the study, highlighted the objectives, statement of the problem, ethical issues and also looked at the limitations and delimitations. The next chapter will look at the literature review.
CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction
The review of related literature examines works of other researchers who carried out studies in the field of difficulties faced by pupils with disabilities in the learning of mathematics. The review intends to provide insight into the methods and approaches used by other researchers and also look at their results. The purpose of this literature review is to gain a better understanding of what inclusion is, what disability is, and the difficulties faced by pupils with disabilities in the learning of mathematics.

2.2 Theoretical framework
2.2.1 Inclusion
Inclusion is a philosophy that brings students, families, educators and community members together to create schools and other social institutions based on acceptance, belonging and community Salend (2001:5). In theory, inclusion is practised in schools to establish collaborative, supportive, and accommodations that they need to learn, as well as respecting and learning from each others’ individual differences Salend (2001). Inclusion is not necessarily just focused on students with disabilities. When implemented correctly it is also designed to be able to accommodate and respond to the needs of regular education students as well. Inclusion is about the child’s right to participate and the school’s duty to accept the child. Inclusion rejects the use of special schools or classrooms to separate pupils with disabilities from pupils without disabilities. A premium is placed upon full participation by students with disabilities and upon respect for their social, civil and educational rights. Inclusion gives pupils with disabilities skills they can use in and out of classrooms. Fully inclusive schools, which are rare, no longer distinguish between, general education and special educated programmes. Instead the schools are restructured so that all pupils learn together. Inclusions have two sub-types the first is called regular or partial inclusion and the other is full inclusion. In this research, full inclusion was preferred as it is the one at Danhiko Secondary School. According to Lipsky and Gartner (1997), full inclusion is the integration of all pupils, even those that require the most substantial
educational and behavioural supports and services to be successful in regular classes and the elimination of special, segregated special education classes.

Salend (2001), states that there are four main principals that provide a framework and summarize the philosophies on which inclusive practises are based. Firstly, there is diversity- effective inclusion improves the educational system for all students by placing them together in general education classrooms, regardless of their learning ability, race, linguistic ability, economic status, gender, learning style, ethnicity, cultural background, religion, family structure and sexual orientation. Inclusion schools welcome, acknowledge, affirm and celebrate the value of all learners by educating them together in high quality age appropriate regular education classrooms in their neighbourhood schools. All students have opportunities to learn and play together and participate in educational, social, and recreational activities. These inclusionary practises, which promote acceptance, equity and collaboration, are responsive to individual needs and embrace diversity. Inclusive education tries to reflect the real society that is normal with all people of different reasoning levels and abilities. If a society has people without differences it ceases to be normal. According to Esen Hower (2000), it takes all sorts of people to make a world. As a result inclusive education promotes teamwork among all different groups of pupils without discrimination of physical challenges.

Secondly, there is a strategy referred to as Individual Needs- effective inclusion. It involves sensitivity to and acceptance of individual needs and differences. Educators cannot teach students without taking into account the factors that shape their students and make them unique. Forces such as disability, race, linguistic background, gender and economic status interact and affect academic performance and socialization. Therefore, educators, students and family members must be sensitive to individual needs and differences. Inclusive education is good to the teacher who is dynamic flexible and reflective in ability to respond positively to situational demands. The use of different teaching methods and different pupil’s organisation and activities is encouraged. These methods, organisation and activities assist all learners to meet their needs and enhance motivational stimulus for the progression on lessons. In inclusive classrooms, all students are valued as individuals capable of learning and contributing to society. They are taught to appreciate diversity and to value and learn from each other’s similarities and differences.
Thirdly, there is Reflective Practise – effective inclusion requires reflective educators to modify their attitudes, teaching and classroom management practises, and curricula to accommodate individual needs. In inclusive classrooms, teachers are reflective practitioners who are flexible, responsive and aware of students’ needs. They think critically about their values and beliefs and routinely examine their own practises for self-improvement and to ensure that all students’ needs are meet such educators individualize education for all students in terms of assessment techniques, curriculum accessibility, teaching strategies, technology, physical design, adaptations, and wide array of related services based on learners’ needs. Students are given a multilevel and multimodality curriculum, as well as challenging educational and social experiences that are consistent with abilities and needs.

According to Salend (2001), there is also the collaboration effective inclusion which is a group effort. It involves collaboration among educators, other professionals, students, families and community agencies. The support and services that students need are provided in the regular education classroom. People work cooperatively and reflectively, sharing resources. Learners are involved to assist each other as pupils learn from peers more conveniently than when only left alone of those with same challenges. Inclusive education promotes interaction among learners. The communication skills improved and most pupils tend to tolerate others’ problems in their learning groups. The variety in knowledge application and reasoning developed across sharing of ideas and cooperation without isolation. If the right to education for all is to become a reality we must ensure that all learners have access to quality education that meets basic learning needs and enriches lives. Education is not simply about making schools available for those who are already able to access them. It is about being proactive in identifying the barriers and obstacles learners encounter in attempting to access opportunities for quality education as well as in removing those barriers and obstacles that lead to exclusion.

Inclusive education is now being promoted as it encourages cooperation in learning for all learners despite the levels of learning and other physical disabilities found in learners. According to Doctor Murinda (2005), inclusive education in Zimbabwe means a variety of educational provisions for pupils with special needs. Murinda further pointed out that those children who
were previously being segregated in schools are now being accommodated in mainstream classes. Inclusive education in Zimbabwe is a structure or system whereby all the different types of learners learn together. The learners can be identified as slow or gifted learners, and those who are physically challenged who suffer from visual impairment, hearing impairment and so on. Teachers should include all those learners despite their challenges under one roof in a classroom situation. Inclusive education according to Forest and Pear point (2004), is being implemented in most schools as a way of promoting living and learning together in an effort to do away with the spirit of segregation, isolation of those learners with challenges and help them to have the sense of working with their peers as is normal in any community set up. Inclusive education can be effectively provided through the provision of special devices and other suitable strategies that can overcome these challenges faced by the learners. For instance the visual and audio impaired devices use of large visual charts and audiograms respectively are useful responsibilities, skills, decisions, and advocacy for the students’ benefit. School districts should provide support, training, time and resources to restructure their programs to support individuals in working collaboratively to address students’ needs.

An inclusive education system has its own challenges which may need holistic approach to promote the learning of togetherness. Inclusive education tends to neglect the special need of children. According to Child (1976), pupils with special needs require individual instructions and extra love as they feel neglected because of their needs. It is difficult for the teacher to provide the much needed care especially to the handicapped that need extra care as they feel neglected. Parents of disabled pupils may not be happy in including their children in inclusive classes because they think their children would not benefit well because of their challenges. Inclusive learning promotes slow learning environment as it accommodates those learners and others with physical challenges .According to Wood (1993) inclusive education encourages those with physical challenges to enhance their sporting activities.

2.2.2 Disability

There is not any particular definition that can exhaustively give the meaning of the term ‘disability.’ Instead, the term is open to various definitions and conceptualizations used by different actors. Even the United Nations Convention on the Rights of Persons with Disabilities
does not define disability in explicit terms, apart from elucidating on the different categories of
disabilities. It provides that pupils with disabilities include those who have long-term physical,
mental, intellectual or sensory impairments which in interaction with various barriers may hinder
their full and effective participation in society on an equal basis with others’ (Article 1 CRPD).
Citing Basser and Jones (2002: 255-6), Combrinck (2008: 302-3) wrote that

    the concept of disability includes people whose activity is limited by physical
disabilities, those with visual or hearing disabilities, those with chronic illness,
mental health and communication disorders, those with intellectual disabilities,
genetic disorders and disfigurement, and those with problems associated with
aging or with delay in achieving developmental milestones.

Disability is the consequence of an impairment that may be physical, cognitive, mental, sensory,
emotional developmental or some combination of these. A disability may be present from birth,
or occur during a person’s lifetime; some disabilities are visible to others such as blindness or
paralysis. But many are not, for instance, certain mental illnesses affect people’s ability to do
their job or manage a household. Some pupils are born with disabilities but other disabilities
result from illness or an accident. Many disabilities come on as people age. According to Rioux,
Marcia and Bach (1994) as the number of older Americans grows so does the number of pupils
with disabilities. Some disabilities are visible and others are not immediately apparent to others.
Types of disabilities most commonly found at Danhiko secondary school include those with
physical disabilities who are able to bath and move either using wheelchairs or on their own.

Mobility impairment is a broad category that includes any condition that makes it difficult for the
pupil to move about and use their upper and lower limbs. Another group of pupil with disability
found is those with hearing impairment. Hearing impairment describes an impaired ability to
hear and discriminates sounds. There may be a decreased ability to hear, or ability to hear at all,
or a pupil may struggle with processing sounds that is auditory processing disorder. Hearing
impairment can occur in different areas of the hearing pathway and may be genetic or caused by
non-genetic factors. The other types of disabilities found are those with chronic problems and
most commonly found is the cerebral palsy, allergies and epilepsy. These conditions may restrict
a pupil’s full participation in all school activities.
According to Zola (1983), disability is an umbrella term, covering impairments, activity limitations and participation restriction. An impairment is a problem in body function or structure, an activity limitation is a difficulty encountered by an individual in executing a task or action, while a participation restriction is a problem experienced by an individual in involvement in the life situations. According to Morris and Jenny (1991), Disability is thus not just a health problem. It is a complex phenomenon, reflecting the interaction between features of person’s body and features of the society in which he or she lives. Overcoming the difficulties faced by pupils with disabilities requires interventions to remove environmental and social barriers. Pupils with disabilities have the same health needs, educational needs as non-disabled pupils. They also may experience a narrower margin of health, education both because of poverty and social exclusion and also because they may be vulnerable to secondary conditions such as pressure sores or urinary tract infections. Evidence suggests that pupils with disabilities face barriers in accessing the health and rehabilitation services they need in many settings. Ethenne Krug, director of WHO’s department of violence, injury prevention and disability says that, while conditions facing disabled pupils vary from country to country, basic problems remain the same. In all countries there is still stigma and discrimination. In all countries there are still challenges to access like transportation or public building or access to school and employment.

Pupils with disabilities are likely to have poorer health outcomes, lower educational achievements, less participation in the economy and higher poverty rates. Some disabled pupils have managed to escape this fate, becoming brilliant leaders in society. According to Zola (1983), it is difficult to find a general definition of disability because there are many forms of disabilities. It is more helpful then to look at several types of disabilities in order to unpack some of the characteristics of a disability, as well as the banners that exist for pupils with disabilities. There is a broad range of disabilities both physical and mental, that impacts a person’s sense of self worth and their involvement with and contribution to a community within this range are developmental, learning and other physical disabilities, including hearing, sight, speech, agility and mobility disabilities. Pupils may face the challenges of mental illness such as bipolar disorders, schizophrenia and depression. There are some people who seem to function like others but deal privately with profound challenges because they are living with “hidden” disabilities.
These may be chronic conditions such as cancer, epilepsy, cerebral palsy, spinal bifida cystic fibres and others.

According to Stone (1984), those who have disabilities may experience the following difficulties in physical mobility, understanding or being understood, finding a job or keeping one, learning new information or skills, self care and other daily living skills. In research, the researcher looked at difficulties faced by pupils with disabilities in the learning by pupils with disabilities in the learning of mathematics at ordinary level. There are many people with disabilities and unfortunately many continue to live in extreme poverty, are unemployed or underemployed and lack adequate disability supports that would enable them to work, volunteer and live life to its fullest like all other people. According to Garnett (1998), rates of violence and abuse against people with disabilities, in particular, women with disabilities are among the highest for any group in society. According to Garnett (1998), people with disabilities still face barriers and discrimination which prevent them from participating or contributing as equal members of society. For example, a child with a learning disability may have difficulty engaging other children in play or conversation one might also have problems with their family or in relationships. Those difficulties sometimes make them feel very anxious, discouraged or angry feelings certainly not linked to those with a disability. They may also feel ashamed, embarrassed or misunderstood and may try to hide their frustrations. They might be perceived however as being moody and uncooperative. Those who do not experience a disability or have little knowledge of another’s disability might misunderstand, possibly leading to insensitivity or unfair judgements about one’s behaviour.

According to Stone (1984), there is a strong correlation between poverty and people with disabilities. A pervasive but not exclusive component of poverty is the underemployment of people with disabilities, especially those who are sole income providers. Pupils with disabilities are often discriminated against when they search for jobs. If they are able to secure a job, it is often with lower wage, and the income support programs disappear. Also, people most vulnerable to abuse, whether verbal, physical, sexual or other are those with disabilities, particularly women who have profound disabilities. It is mostly to women because of their dependence on others to care for them. There are many varying kinds of abuse especially against
pupils at school. Firstly there is neglect by family or friends such as the denial of food, lack of or inappropriate personal or medical care. There is also physical abuse it can be verbal abuse intimidation, social, isolation, emotional deprivation and denial of the right to make personal decisions. There is also sexual abuse where pupils may be denied of sexual information/education, verbal harassment, unwanted sexual touching and assault. Conclusively living with disability is difficult but can sting even more when other people are impatient, rude, insensitive, inconsiderate, pessimistic or unhelpful. All pupils face challenges, it is just that pupils with disabilities face different challenges. In this study the researcher concentrated more on difficulties they face in the learning of mathematics at ordinary level.

2.3 The fear of mathematics (mathophobia)
Zacharias cited in Teacher in Zimbabwe, (April 1993:25) concluded that the major problem with the learning and teaching of mathematics was ‘mathophobia’. Mathophobia, is the fear of mathematics. He also found out that the majority of pupils have come to believe that mathematics must be difficult, unpleasant and mysterious. It is assumed that it is due to these and other factors that contribute to power performance in mathematics by ordinary level pupils with disabilities. Many people’s images of mathematics represent mathematics negatively, such that mathematics is perceived to be difficult, cold, and abstract and in many cultures largely masculine. Ernest (1996:802), mathematics is a difficult subject.

Henderson (1981:12) claims that the majority of people today are scared of mathematics (and mathematician) and feel powerless in the presence of mathematical ideas. There is a widespread conception that the public attitude towards mathematics is largely negative. A Cockcroft Report department of Education and Science (1982), reported Brigid Sewell’s experience that half of the members of the public she stopped to interview on the street immediately declined and walked away when they learnt it was mathematics. This indicated a negative attitude. As a result of these negative expectancies may lower their self-esteem in some people’s mathematics and consequently lower performance in mathematics. From these proposed contributing factors, it appears that students’ attitudes of mathematics may be greatly influenced by social and cultural views. In other words, the research argues that public view of mathematics could possibly play an important role in shaping the image of mathematics of our future generation.
2.4 South Africa mathematical science association 10th Biennial conference: held at the University of Zimbabwe (The Herald 19/12/1995)

During this conference whose theme was “mathematics for development” Vuma the chairman of University of Zimbabwe Mathematics Department that year said that, ways of encouraging pupils to do mathematics in secondary schools has to be found. Vuma was implying that at secondary school level, there is general apathy towards the learning of mathematics and as a result most pupils with disabilities perform badly in mathematics. Teachers and parents should avoid comparing the disabled child with other children. Disabled children require a lot of motivation and special attention along with classroom training. Kogce (2009) said that teachers can make mathematics lessons interesting by using effective aids such as attractive pictures, symbols, charts, riddles and puzzles. Pupils should be allowed to use the charts and pictures until they get their concepts cleared. Patience and the presence of mind are the key to avoid calculation mistakes. Teachers need to inculcate these values in the disabled students. McErean (2000) argue that for secondary school pupils with disabilities, the adequacy of instruction in mathematics will be judged not merely on how quickly basic skills can be learned, but pupils must also acquire generalisable skills in the application of mathematical concepts and problem solving.

2.5 People’s perceptions of mathematics as a subject

Many people’s images of mathematics represent mathematics negatively such that mathematics is perceived to be “difficult, cold, abstract and in many cultures, largely masculine. According to Ernest (1996), Mathematics is a difficult subject. Many people view mathematics as a difficult subject and in an inclusive setup, both the disabled and nondisabled pupils view mathematics as a difficult subject and this affects their performance in mathematics. As parents, people who interact with pupils, view mathematics as a difficult subject. This affects their performance in the subject. They do not have encouragement from people outside. Many people, both pupils and adults, appear frightened of mathematics or maintain that they hate it. Unlike other subjects, mathematics is viewed by pupils as a challenging subject. Majority of pupils fear mathematics and this affects their performance in the subject. According to Hannel (2005), in Europe defined mathematics is a subject in which we never know what we are talking about or whether what we are saying is true. This clearly indicates negative attitudes towards mathematics.
In America, mathematics is viewed as largely irrelevant or unimportant subject because of its demands. According to Keith (1997), in America, they are trying to change people’s perceptions of mathematics by using television, writing scholarly journals and writing books. According to Carnellor (2004), in America, if you pick someone at random on the street and ask them to describe mathematics in a single sentence, the answer you are likely to get is something along the lines, mathematics is using numbers. According to McLeod (1992), many people in American countries are not embarrassed to proclaim their ignorance or poor performance in mathematics, unlike on other subjects. Educators attempt to explain this phenomenon through the widespread beliefs or mathematical myths that learning mathematics is a question more of ability than effort or there is an inherent natural ability for mathematics. Thus many people accept this lack of accomplishment in mathematics as a permanent state over which they have little control. Even though mathematical myths are not necessarily false beliefs, they are mostly negative and could be harmful in distorting the image of mathematics by pupils.

Many Americans believe that mathematics is a difficult subject. It is claimed that to many people, mathematics is perceived as a difficult subject to learn and to teach. The notion of mathematics as a difficult subject is taken by some people as a challenge, whereby if they succeed in solving the mathematical problems, then there is a strong sense of satisfaction and challenge that can motivate them to go into higher level mathematics. Conversely, if they failed, then this sense of failure might result in low self-esteem. In America, mathematics is considered to be only for the clever ones. Closely related to the preconception that mathematics is difficult, is the claim that it is only for the clever ones, or only for those who have “inherited mathematical ability.” Consequently, people who excel in school mathematics are highly respected and considered to be the intelligent few. This is a common perception in most countries in the world. In America, they are also perceived to be an odd species. For those who fail or perform poorly in school mathematics, it is often assumed that they did not have the so-called mathematical ability.

Mathematics is also considered as a male domain. According to Isacson (1989), he proposes that mathematics has been seen to be a hard subject not necessarily in the sense of intellectually difficult but hard as opposed to soft or feminine. This leads us to another widespread
mathematics myth that mathematics is a male dominant subject. Gutbezahi (1995), in China suggested that some pupils’ underachievement in mathematics might be related to the negative expectancies and attitudes of their parents, teachers and peers. As a result, these negative expectancies may lower their self-confidence in some pupils’ mathematics and consequently their lower performances in mathematics. Their lower performances reinforce the parents’ and teachers’ negative expectancies and the vicious cycle perpetuates.

If public images of mathematics are negative, then according to Howson and Kahane (1990), these negative views are the major contributing factors to some problems in mathematics education. If pupils perceived mathematics as a difficult subject and they lack self-confidence in the subject then they will avoid taking up the subject and will influence other peers negatively. The effect of socialisers including parents, teachers and peers in influencing both subject choice and career choice could be subtle but powerful. If public image of mathematics is bad then we can expect that these socialisers or significance others in the lives of pupils are likely to discourage the pupils from taking up mathematics. According to Sewell (1981), he proposed that teachers’ attitudes, the formality of much mathematics teaching, the seeming lack of relevance of mathematics to everyday contexts, fear of the subject, literacy problems, gaps in schooling and parental expectations are few possible causes of negative attitudes towards mathematics.

2.6 Mathematics performance in general
Generally pupils’ performance in mathematics is low compared with other subjects offered to pupils in an inclusive school. The Ghana Mathematics Society (GMS) said the scenario where many students were failing mathematics both internationally and locally was not acceptable. South African schooling system shows the following characteristics, the national mean mathematics scores are low and need to improve. For the underperforming schools, mathematics performance continues to be low. Mathematical knowledge is hierarchical in nature, and therefore strong prior knowledge is critical for conceptual development.

2.7 Disabilities and school performance
Spear-Swirling (2005) pointed out that, disability can further compromise student learning, especially if the disability affects recall of information and the generalization of skills from one learning situation to another. Many different disabilities can affect children’s mathematics
learning and performance, but none more than disabilities that affect cognition, mental retardation, traumatic brain injury, attention deficit/hyperactivity disorder and learning disabilities to name a few. Several specific areas of disability are clearly connected to mathematics learning difficulties. Visual processing, visual memory and visual spatial relationships, all impact mathematics proficiency in that they are threads in the fabric of conceptual understanding and procedural fluency (Kilpatrick 2001). Specific mathematics learning difficulties also can affect a pupil’s ability to formulate, represent and solve mathematical problems.

2.8 Performance in mathematics by pupils with disabilities
Silon and Harter (1985) pointed out that with respect to children with physical disabilities they saw themselves as performing less well than their typically developing peers. With this notion, pupils with disabilities perform low academically. Mathematical difficulties often co-occur with dyslexia and other forms of language difficulties. In particular people with dyslexia usually experience at least some difficulty in learning numbers of facts such as multiplication tables. Overall, however a person with general learning difficulties tends to show similar mathematical performance and strategies to typically developing individuals of the same mental age. What has been found in a number of studies however is that those with disabilities score lower than those without. Girdnick and Ryan (1990) found that students with disabilities scored lower on cognitive competence and academic self-regulation relative to the non-disabled control groups but they did not differ on general self-perceptions of control or competence. Pupils with disabilities’ performance in mathematics are low since it is an academic subject. Other researchers have spent time comparing the mathematics performance of pupils with disabilities with that of students without disabilities. Although reports have emerged discussing the poor mathematics performance of many general education pupils in the United States (Dossey, Mullis Linguist and Chambers, 1988 Lapointe, Mead and Phillips 1989), numerous investigators have found that pupils with learning disabilities experience even greater difficulty in mathematics than their peers without disabilities.

2.9 Teaching methods employed by mathematics teachers
Mathematical difficulties can affect performance in other aspects of the curriculum and partly to prevent the development negatively attitudes and mathematical anxiety. There are several guides
for teachers, influenced both by research findings and by teachers’ experience, regarding strategies for dealing with individual difference within a class, and including children with mathematical difficulties. Common approaches include the provision of a variety of differentiated activities for different pupils working on the same topics, and including revision and consolidation session for all pupils streaming and setting are sometimes used.

The National Numeracy Strategy is a developing intervention technique for children who are struggling with mathematics. The Numeracy Strategy incorporates three ‘waves’ or levels of intervention. Wave 1: whole-class teaching for all teaching (e.g. the Daily Mathematics Lesson) Wave 2: intervention in small groups with children who are experiencing mild or moderate difficulties in the subject. Wave 3: targeted intervention for children with special educational needs. Ginsburg (1977) and his colleagues carried out several individual case studies of children who were failing in school mathematics. Such children typically combined significant strengths with specific weakness. Some had a good informal understanding of number concepts, but had trouble in using written symbolism and standard school methods. Some had particular difficulties with the language of mathematics.

There is much research that indicates that the school environment and teaching methods are important influences on the mathematical performance of children throughout the ability range. Appropriate teaching may prevent some mathematical ‘difficulties’ from ever becoming apparent and many mathematical difficulties are undoubtedly mainly the result of limited or inappropriate teaching. According to Brooks (2003), in London, tools of access are means of circumventing a difficulty which does not affect mathematics learning directly but which may interfere with a child’s benefiting from standard forms of mathematics teaching or mathematical activities. Examples may include the provision of a sign language interpreter for a child with hearing impairment, oral presentation of material to a visually impaired, or dyslexic pupils, or allowing a dyslexic or dyspraxic child to use a word processor instead of writing by hand.

2.10 Peer tuition and group collaboration
One way in which schools can deal with mathematical weaknesses is by encouraging children to teach one another. This can involve competent children teaching the incompetent children, more able classmates, or collaborative learning between peers of similar ability. All of these
techniques have been used extensively in general teaching. This involves children cooperating in solving a mathematical problem. This can serve several purposes that are increasing motivation, encouraging children to put their mathematical ideas into words and to reflect on the strategies that they use and in enabling children to transmit mathematical knowledge and ideas into one another. Davenport and Howe (1999) looked at the effect of collaborative learning on children’s ability to solve addition, subtraction and word problems. Children worked in groups, using problem solving guidelines that they had been given, to solve the problems and then ‘taught’ their problem to a fellow pupil. The children in the collaborative condition were compared with children who solved the same problems individually. The children in the collaborative condition performed better than those who worked individually and in particular children who were below average in mathematics benefited from being the ‘learners’ who listened to peers. Metacognition awareness of one’s own mental strategies and level of knowledge is often regarded as particularly important to mathematics. Current mathematics education in Britain and other countries has placed increasing emphasis on encouraging children to reflect on and discuss their mathematics ideas and strategies. Adey and Shayer (1994), in London, found that pupils who had taken part in their cognitive Acceleration Programme (emphasizing both Meta-cognitive and Piagetian training as discussed above) were significantly more likely than controls to perform well in mathematics. Peer tuition and group collaboration also allows pupils opportunity to make new friends and share new experiences.

2.11 Social and emotional characteristics

According to Cherkes and Julkowski (1985), the affective domain also is recognized as an important variable in the mathematics performance of pupils with disabilities. For example, it is believed that repeated academic failure frequently results in low self-esteem and emotional passively in mathematical learning. The emotional reaction of some individuals to mathematics is so negative that they develop mathematics anxiety. This condition is believed to stem from a fear of failure and low self-esteem and causes pupils to become so tense that their ability to solve, learn or apply mathematics is impaired (Slavin, 1991). Confused thinking, disorganization avoidance behaviour and mathematics phobia are common results.
The social and economic status of people with disabilities in Uganda is particularly precarious, with there being a high correlation between the incidence of poverty and disability. The Northern Uganda Survey of 2004 estimated that 72% of people with disabilities in the Northern Region of Uganda are living in a state of chronic poverty, with men far more likely to be poor than women. In analyzing the relationship between poverty and disability, NUDIPU in their Strategic Plan 2008-2013 state, poverty and disability are impossible to disentangle. The causes of extreme poverty among the disabled are multiple including; the lack of access to education for most of the pupils with disabilities and those who access education most of them don't complete their education, especially girls and women. Due to lack of access to education most pupils with disabilities do not have skills and competencies required to get employment or get involved in any activities that gives them any livelihood. Disability and poverty can also be traced from deep rooted negative cultures, where a disabled child is looked at as a curse or more so if the child is a girl then they are denied food, education and health care among others. Furthermore, from the evidence gathered during the focus group discussions and the informant interviews conducted in Uganda study, it is very clear that people with disabilities encounter high-levels of social exclusion, marginalisation and discrimination. Majority of pupils with disabilities do not attend primary schools, and even for those who do, the vast majority do not complete their primary education. This in turn leads to further exclusion, because few are able to gain sustainable long-term employment. Within Uganda, there are services for people with disabilities, but these are inadequate to meet the level of demand. The Ministry of Gender, Labour and Social Development runs community-based rehabilitation programmes in 10 districts, but it is not in a position to scale up these services to cover the whole country. In principle, the Ministry of Education and Sports endorses the principles of inclusive education, yet national disabled people's organisations with the support of the President are lobbying for more special schools to be built, in the belief that such schools will provide a better education. Therefore, education policy in Uganda is in a state of hiatus and stalemate.

Clearly there are advantages and disadvantages to both approaches to education, with no one size fitting all. International evidence would suggest that, in the ideal situation, inclusive education is the best approach. If children with disabilities attend mainstream schools, this promotes social inclusion because children with disabilities interact with non-disabled children on a daily basis.
Hence, from a very early age, many of the negative stereotypes with regard to disability are broken down. However, inclusive education will only work effectively if there are sufficient human and financial resources available. In the absence of such resources, children with disabilities who do attend mainstream schools are like to receive an inferior education. Merely placing children with disabilities in mainstream schools does not necessarily result in a genuinely inclusive educational environment.

Pupils with disabilities face many difficulties in their lives. However, according to Carol Aloysius of The Sunday Observer, (2002), disability does not disable a person. Discrimination, social stigma and poverty do. Therefore it is important to be aware of the people who are interacting with disabled child. Nevertheless, with adequate care and education, disabled pupils can lead rich and happy lives. According to Carol (2002), a serious problem that pupils with disabilities face is mockery and derision by others. The adolescent and teenage years can be a difficult time for anyone but pupils with disabilities often face a higher degree of teasing and taunting due to their mental and physical differences. Pupils with disabilities may also experience more teasing because they have difficulty standing up for themselves.

Pupils with disabilities can also face difficulty of increased isolation. Although it is not always the case, pupils with disabilities can be ignored by their peers and adult figures. Other pupils may find it difficult to interact with pupils with developmental challenges, while adults may tend to focus on pupils without these problems. As severity of the disability increases, the pupil may become increasingly isolated. Extreme disabilities may cause a child to be confined to his home or an institution. A tragedy that pupils with disabilities face is abuse or neglect. Pupils with certain disabilities are unable to stand up for themselves or maybe unaware that they are being abused. There is also a strong link between poverty and disability. Without proper care or education, pupils with disabilities are at greater risk of becoming impoverished or homeless, for instance, according to a study in the United Kingdom, the poverty rate for disabled people was 23,1 percent compared to 17,9 percent for non-disabled people but when extra expenses associated with being disabled were considered, the poverty rate for people with disabilities shot up to 47,4 percent.
2.12 Curricula and instruction
According to Baroody (1991), an educational factor that undoubtedly contributes to poor mathematics performance among pupils with disabilities is poor curricula and instruction. Teaching in today’s school is undoubtedly a difficult task. Poorly constructed texts and materials, coupled with the increasingly diverse pupils’ population, results in many classroom challenges.

Inclusive Education is based on the right of all individuals to a quality education with equal opportunity, one that develops their potential and respects their human dignity. These supports may include flexible curriculum for some students, adequately prepared teachers, and a welcoming school community culture that goes beyond tolerance to acceptance. An inclusive approach to education portends that all children have the potential to learn without making reference to their differences, by enabling education structures, systems and methodologies to meet the needs of all children(Combrinck 2008:305). The focus shifts to the systems that must be arranged in such a way that all children with their varied statuses are accommodated within the schooling system. Inclusive education was given a boost following the world conference on education for all. A UNESCO-organised conference in Salamanca, Spain in 1994 brought together senior education officials, administrators, policy-makers and specialists, as well as representatives of the United Nations and the Specialized Agencies, other international governmental organizations, nongovernmental organizations and donor agencies (UNESCO 1994). The conference was mainly to further the objective of Education for All by considering the fundamental policy shifts required to promote the approach of inclusive education, namely enabling schools to serve all children, particularly those with special educational needs. The Salamanca Statement remains the most detailed and guiding international document on inclusive education. Article 7 of the statement provides that the fundamental principle of the inclusive school is that all children should learn together, wherever possible, regardless of any difficulties or differences they may have.

Inclusive schools must recognize and respond to the diverse needs of their students, accommodating both different styles and rates of learning and ensuring quality education to all through appropriate curricula, organizational arrangements, teaching strategies, resource use and
partnerships with their communities. There should be a continuum of support and services to match the continuum of special needs encountered in every school. ‘the knowledge and skills required in an inclusive learning environment are mainly those of good teaching and include assessing special needs, adapting curriculum content, utilizing assistive technology, individualizing teaching procedures to suit a larger range of abilities. Across the board during my interaction with school teachers, they reported that teachers were not trained to deal with pupils with disabilities. The lack of training meant that children, with or without disabilities, were combined together and subjected to the same teaching methods without due consideration for pupils with disabilities.

The curriculum in an inclusive education setting should be adapted to suit the needs of all the learners. The Salamanca Statement devotes considerable attention on the nature of curriculum that should be used in an inclusive setting. The Statement provides that curricula should be adapted to children’s needs, not vice versa. Across the schools visited and the interviews conducted with selected teachers, respondents reported that the curriculum had not been adjusted to accommodate pupils with disabilities. Mr. Willy Turyahikahe, a Senior Man Teacher at St. Jude Primary School said that it was a responsibility of the teacher handling a combined class of both children with and those without disabilities, to ‘improvise’ and take care of pupils with disabilities. He said in the end, only those that can cope will benefit because there is no way a teacher can improvise. It also emerged that the curriculum currently under implementation in most, if not all, UPE schools was more theoretical and exam-oriented. Ms. Abuku Beatrice, a Teacher at Kyambogo Primary School opined that ‘a practical-oriented curriculum would be ideal for pupils with disabilities. Her position was echoed by another teacher at St. Paul Primary School, Mr. Haswa Ibrahim who said curriculum would be appropriate if it emphasized practical teaching. There is need for more practical skills than theory – knitting, weaving, carpentry, etc.

The Salamanca Statement provides that, the acquisition of knowledge is not only a matter of formal and theoretical instruction.

The content of education should be geared to high standards and the needs of individuals with a view to enabling them to participate fully in development. Teaching should be related to pupils’ own experience and to practical concerns in order to motivate them better. The present design of
the curriculum is more appropriate for the nondisabled children. This makes it hard for pupils with disabilities to participate actively. Although they may continue attending, it is unlikely that the knowledge and skills imparted in such an arrangement will have impact on their lives. Abosi and Koay (2008: 8) had the following to say on a vocational-oriented curriculum,

*Education of children with disabilities should aim at assisting the children to acquire survival skills. This means that any curriculum that is designed for the participation of children with disabilities must be vocational oriented.*

*The curriculum of an inclusive system should include training in skills such as carpentry, sewing, telephone operating, computers, art work, home economics, and music.*

The curriculum was further found to be inflexible especially with regard to the design and management of timetables. When interviewed Ms Abuku Beatrice added that ‘during exams, the timetable does not take care of pupils with disabilities yet in ideal situations pupils with special needs would need more time for instance, to accomplish the same assignment done by a non-disabled peer. The UNESCO guidelines on inclusive education provide that: an inclusive approach to curriculum policy has built-in flexibility and can be adjusted to different needs so that everyone benefits from a commonly accepted basic level of quality education. This ranges from varying the time that students devote to particular subjects, to allow more time for guided classroom-based work. No adaptations on the curriculum to correspond to the needs of an inclusive arrangement have been undertaken, as earlier reported, and teachers are required to improvise so that they can bring pupils with disabilities on board while conducting lessons in inclusive classes. This mechanical way of handling classes cannot facilitate meaningful learning. Leaving the curriculum to be decided at the discretion of teachers is counterproductive, instead there should be well elaborated procedures detailing how knowledge and skills should be imparted.

The Salamanca Statement provides that schools should provide curricular opportunities to suit children with different abilities and interests. In Uganda, The Draft Policy identifies the National Curriculum Development Centre as a key institution in the realization of inclusive education, whose responsibilities include, among others designing, reviewing and adapting the curricula to
suit special needs education, orienting teachers on designing and using special needs instructional materials and equipment in special needs education, orienting teachers on curriculum adaptation and implementation. (MEoS 2011: 28). In an interview Ms Rosert Kemizano, Curriculum Specialist – Special Needs Education at the National Curriculum Development Centre, was asked about having a vocational-oriented curriculum, in which she acknowledged the exam orientation of the current curriculum but added that there are efforts for trying to make it more practical but it will take time to make it a reality. Our community is already brainwashed thinking that passing examinations is everything. Children with special needs find it difficult but there is no way out because that is the trend.

If the Curriculum Specialist’s position is anything to go by, it is a further evidence of the need to involve the community in the implementation of programmes for pupils with disabilities. By involving them, an opportunity is availed to bridge the gap by elaborating some of the misunderstandings that still obscure pupils with disabilities’ enjoyment of their social rights where they suffer immense levels of exclusion. Efforts will have to be taken to sensitize communities on wide-ranging disability issues. Sherman, Richardson and Yard (2005), remind us that mathematics instruction must provide many opportunities for concept building, relevant challenging questions, problem solving and connections within the curriculum and real-world situations. Westwood (2000), also reminds that the educator is the pivotal person in ensuring successful learning.

2.13 Texts and materials
At the high school level, textbooks are typically used to determine the instructional mathematics programme for students. According to Tyson and Woodward (1989), studies reports that 75% to 90% of classroom instruction is based on textbooks and in most cases, those books define the scope and sequence of the material being taught. The lack of appropriate mathematics materials for teachers to use compounds the problem of poor curricula and instruction. Historically, according to Bartel (1982), the reading and language problems of pupils with disabilities have received more research attention than their mathematics. Unfortunately, negatively affects teacher training in mathematics and the creation of effective educational materials, which in turn negatively affects pupils’ learning. A related problem is the lack of field testing of educational materials. Sprick (1987) reported that only 3% of educational materials are field tested with
students prior to being published. Thus most commercial mathematics materials are sold without first being used with pupils to determine their effectiveness. A marketing survey found that the most important characteristics in the sale of mathematics textbooks were the attractiveness of the art. To compound these problems, Carnine (1992) commented that most textbooks are not written by teachers or individuals who have been trained as educators.

In a study conducted by the Uganda Society for Disabled Children, one child with visual impairment is quoted to have said, *I have never seen or touched a skeleton yet I am required to explain what a skeleton is in the examinations*, (USDC 2003: 53). It is illusory to believe that inclusive education can be actualized without spending the necessary required resources to establish the learning environment for pupils with disabilities. Assistive devices such as Braille and hearing aids, for instance, are a must for children with visual and hearing impairments respectively, to facilitate their participation in a learning process. The issue of inadequate finances emerged as one single and constant factor, ranging from procuring assistive devices for children with special needs, aligning the curriculum to suit the needs of these children, training of teachers, to modifying physical infrastructure, to mention a few. These aspects directly or indirectly impede progress in the realization of the right to education for pupils with disabilities. The importance of resources in the realization of human rights needs no elaboration.

Use of concrete materials is very crucial in the learning of mathematics. It is materials that provide tangible ways to explore mathematical ideas and for educators they are a window into pupils thinking. Counters, base 10 materials, interlocking blocks, real money it’s never quite the same with plastic or just being said. Provide materials to manipulate and talk about. In Australia, one resource already in most schools is an overhead projector. With the use of transparencies and pens, educators are able to model and think aloud as they tackle algorithms and problems. Additionally, there is a wide variety of materials that can be used on the overhead projector for example transparent counters, clocks and calculators. There is research evidence that students who use concrete materials actually representations, often show more motivation and on-task behavior, may better understand mathematical ideas, and may better apply these to life situations. Structured, concrete materials have been profitably used to develop concepts and to clarify early number relations, place value, computation, fractions, decimals, measurement, geometry, money,
percentage, number bases, story problems, probability and statistics and even algebra. Of course, different kinds of concrete materials are suited to different teaching purposes. Materials do not teach by themselves, they work together with teacher guidance and student interactions, as well as with repeated demonstrations and explanations by both teachers and students.

2.14 Implications of the reviewed literature to present study
The literature review discussed above enabled the researcher to broaden her mind. There are other information trends which had not been considered to be part of the study, which were incorporated later. The use of a word processor instead of writing by hand by pupils with dyslexic, dyspraxia, will enable the markers to read their work without difficulties. In Europe and United States of America the use of computers by pupils with disabilities had been introduced. All the researchers found did not look at the difficulties faced by pupils with disabilities, that is what inspired the researcher to do this research. Most researchers looked at difficulties faced by the pupils in mathematics. However in this research the researcher looked at those difficulties faced by pupils with disabilities in the learning of mathematics. The literature has shown that when not implemented appropriately inclusion can have many detrimental effects on those involved with it. Most often socialisation part of their education takes precedence over the academic part of their education. This also forced the researcher to find out difficulties faced on the academic part of education and concentrated on the learning of mathematics.

2.15 Summary
Discussion in this chapter focused upon some of the views put forward by some researchers with regard to the problems faced by pupils with disabilities in the learning of mathematics at ordinary level. Some of the recommended teaching methods of mathematics were also reviewed. Now it remained to be seen in the actual research if what has been casually established has any bearing towards the problem under investigation. The next chapter shall look at the methodology, data collection procedures, instruments for data collection and data presentation and data analysis strategies used.
CHAPTER THREE: METHODOLOGY

3.1 Introduction
This chapter focuses on the research design, the research instruments, types of data collected, sampling procedures, the data collection plan, data presentation as well as data analysis plans.

3.2 Research design
A case study was used in carrying out the research. Yin (1984), defines the case study research method as an empirical inquiry that investigates a contemporary phenomenon within its real-life context when boundaries between phenomenon and context are not clearly evident and in which multiple sources of evidence are used. In this research, Danhiko Secondary School was used. It was chosen because it is the Secondary School with inclusive education where the researcher had plenty of time to carry out the study. A case study is an important and useful method of data collection, especially in cases of rare phenomena. The case study can be either a primary or secondary approach, in this case a primary approach was used. A primary approach is when the researcher collects the data.

A case study allows a lot of detail to be collected that would not normally be easily obtained by other research designs. The data collected is normally a lot richer and of greater depth than can be found through other experimental designs. A case study tends to be conducted on rare cases where large samples of similar participants are not available. One of the main criticisms of a case study is that data collected cannot necessarily be generalised to the wider population. A case study is generally on one person, one area and it tends to be only one researcher collecting the data. This can lead to bias in data collection, which can influence the results more than in different designs. In this study, it was difficult to find out all difficulties faced by pupils with disabilities in the learning of mathematics from the case study as Danhiko Secondary School does not accommodate all types of disabilities. The researcher also observed that, it was also very time consuming to carry out the study.

3.3 Research paradigm
A mixed method was used in this research. It used both qualitative and quantitative methods. Quantitative research design maximizes objectively by using numbers statistics, structures and experimenter control. In this study the data on questionnaire was coded and analysed
quantitatively. Information from record books was used in this research, to show the performance of pupils with disabilities in mathematics tests.

According to Creswell (2007) qualitative research designs usually aim at gaining a deep understanding of specifics of an organization or event rather than surface description of a large sample of a population. It aims to provide an explicit rendering of the structure, or order and broad patterns found among a group of participants. It is also called enthnno-methodology or field research. It generates data about human groups in a social setting. A case study is mainly used to collect detailed information by using a variety of data collection procedures during a sustained period of time. According to Creswell (2007), qualitative researchers use an emerging qualitative approach enquiring, the collection of data in a natural setting sensitivity to the people and place under study, the data analyses that is inductive and establishes patterns or themselves.

3.4 Data collection procedures
The plan involved identification of the population, deciding the sample size, sampling procedure and the administration of the research. The plan detailed the type of data to be collected as well as pilot testing procedures.

3.4.1 Population
Best and Kahn (1993) state that, a population is any group of individuals that have one or more characteristics in common that is of interest to the researcher. This includes defining the population from which our sample is drawn. According to Chimedza and Peters (1999), a population can be defined as including all people or items with the characteristic one wishes to understand. It is a collection of individuals having some common characteristics that the researcher is interested in studying. In this research, ordinary level pupils with disabilities were the targeted population. At Danhiko Secondary School ordinary level pupils with disabilities are forty-three. The population in statistics includes all members of a defined group that one is studying or collecting information for data driven decisions. Therefore the forty-three pupils with disabilities at ordinary level constituted the population of the study.
3.4.2 Sources of data

The data was obtained from ordinary level mathematics teachers and ordinary level pupils with disabilities at Danhiko Secondary School in the Epworth- Mabvuku/Tafara district of the Harare province of Zimbabwe.

3.4.3 The sample

According to Chimedza and Peters (1999), a sample is part of a population under study. It is selected so that inferences about the population can be made or drawn from it. Samples are taken because, it is often not possible to consider all the elements in a population due to costs and time factor. There is very rarely enough time or money to gather the information from everyone or everything in a population, the goal becomes finding a representative sample (or subset) of the population. A part of the population is called a sample. It is a proportional of the population, a slice of it, a part of it and all its characteristics as the population. In this study, the sample comprises four secondary school teachers as well as twenty (20) ordinary level pupils with disabilities.

3.4.4 Sampling procedure

Sampling is the use of subset of the population to represent the whole population. Non-probability sampling is often more suitable for in depth qualitative research in which the focus is often to understand complex social phenomena. In this respect, the sampling method chosen should match the particular focus of the research study at hand. In this study, purposive sampling was used to select the pupils. The researcher chose the sample based on who they think would be appropriate for the study.

According to Singleton (1988), purposive sampling is based entirely on the judgement of researcher, in that a sample is composed of elements which contain the most characteristics, representative or typical attributes of the population. In this research, the researchers sampled twenty pupils with disabilities in form three and form four at Danhiko Secondary School. According to Babbie (2001), a purposive sample also commonly called a judgemental sample is one that is selected on the basis of the knowledge of the study. Purposive sampling can be very useful for situations where need to reach a targeted sample quickly and where sampling for
proportionality is not the main concern. The researcher also used purposive sampling on sampling teachers to involve in the study. She purposively sampled mathematics teachers only, as they are the ones involved with pupils with disabilities in the learning of mathematics.

3.4.5 Sampling of pupils
Pupils were sampled using the purposive sampling technique. The researcher purposively selected pupils with disabilities in form three and form four. After selecting all pupils with disabilities in form three and form four, the researcher randomly sampled twenty pupils from the group.

3.4.6 Sampling of teachers
At Danhiko Secondary School, the researcher purposively sampled teachers in the mathematics department. All the four teachers in the department were selected to take part in the research.

Table 3.1 Number of respondents

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics teachers</td>
<td>4</td>
</tr>
<tr>
<td>Ordinary level pupils</td>
<td>20</td>
</tr>
<tr>
<td>Total number of</td>
<td>24</td>
</tr>
<tr>
<td>participants</td>
<td></td>
</tr>
</tbody>
</table>

3.4.7 Types of data

3.4.7.1 Data collected from teachers
Data collected from teachers included their age, academic qualifications, professional qualifications, number of years of teaching experience, percentage pass rates, number of pupils with disabilities who had written ordinary level mathematics for the past four years, percentage pass rate of pupils with disabilities in mathematics for the past four years, possible causes of such results and possible ways of improving the results. The difficulties faced by pupils with disabilities in the learning of mathematics. Topics which pupils with disabilities have major difficulties in mathematics. How these difficulties can be minimised.
3.4.7.2 Data collected from pupils

Data collected from pupils included their ages, forms in which they are this year, marks obtained in the mathematics tests they have written this year as a percentage. The reasons why they got those marks, their attitudes towards mathematics, methods used by teachers when teaching mathematics. Also the areas and topics pupils with disabilities find difficulties in, why they find difficulties in those topics, what they think can be done for them to reduce the difficulty, their expectations in their final examinations, why they think they will get those results and what they think can be done to improve results.

3.5 Data collection instruments

3.5.1 Questionnaires

According to Best and Kahn (1993), a questionnaire is an instrument consisting of a series of questions and other prompts used for the purpose of gathering information from respondents. The most common instrument or tool of research for obtaining the data beyond the physical reach of the researcher which for example may be sent to respondents who are thousands of miles away or just around the corner. A questionnaire is used when factual information is desired. In this case of this research, questionnaires were used to collect information from pupils with disabilities and teachers.

Questionnaires can be distributed in many ways. In this study, the questionnaires were distributed in person by the researcher. This distribution method has a number of advantages. According to Best and Kahn (1993), the person administering the instrument, who in this case, was the researcher, has an opportunity to establish rapport, explain the purpose of the study and explain the meaning of terms that might not be clear. Availability of many respondents at one place makes possible an economy of time and expense on the part of the distributor of the instrument. In this research, the respondents were all met at Danhiko Secondary School, which enabled the researcher to save time and expense.

Questionnaires were used to collect data for both pupils with disabilities and teachers. A questionnaire contained questions designed to collect information appropriate for analysis. Questionnaires were written questions which were to be answered by respondents in written
form. Questionnaires enabled gathering of data easily and systematically in that questionnaires enabled respondents to go through it and to do as they were given enough time. They were given one week to complete the questionnaires. Thus the questionnaires enabled the respondents to put their minds into responses. Use of questionnaires enabled a number of varied responses to be obtained. According to Alan and Bryman (2007), a well-designed and pilot tested questionnaire is far much better than an observation in which the researcher is limited by the occurrence which may be of interest and need the attention of the researcher.

Usually, a questionnaire consists of a number of questions that the respondents have to answer in a set format. A distinction is made between open-ended and closed-ended questions. An open-ended questionnaire requires the respondents to formulate his/her own answer whereas a closed ended questionnaire has the respondent pick an answer from a given number of options. The response options for a closed-ended questionnaire should be exhaustive and mutually exclusive. In this research, both open-ended and closed-ended questions were set.

The researcher also observed that the questionnaire method has a number of problems as data gathering instrument. These included the fact that filling out lengthy questionnaires takes a great deal of time and effort. Questionnaire can receive an unfavourable response when it is too long, when it is vaguely and poorly organised. Mailed questionnaires may fail to reach their destination. To overcome these problems the researcher chose personal handing of questionnaires to the respondents and made the questionnaires not very long. The researcher felt that some respondents failed to understand some of the questions and they did not have any one to ask. Some respondents answered questions with aim of pleasing the researcher, thus they did not give some response that they think the researcher may not like or may not be looking for. The other problem associated with the questionnaires is the return rate. Often the people that do return the questionnaires are those that have a really positive or really negative view point and want their opinion heard. The people that are mostly likely unbiased either way typically do not respond because it is not worth their time. In this research, a follow up to return questionnaires was made and everyone returned the questionnaires.
According to Cohen, Manion and Morrison (2011), there are two types of self-administered questionnaire, those that are completed in the presence of the researcher and those that are filled in absence of the researcher. In this study, a self-administered questionnaire in the absence of researcher was administered. They were given one week to complete the questionnaires. This method was chosen because it is helpful in that it enables respondents to complete the questionnaire privately, to devote as much time as they wish to its completion, to be in familiar surroundings and to avoid the potential threat or pressure to participate caused by the researcher’s presence. The researcher observed that it was inexpensive to operate and was more anonymous than having the researcher present. According to Cohen, Manion and Morrison (2011), self-administered questionnaires without the presence of the researcher enabled the respondents to be very honest and to reveal sensitive matters.

3.5.2 Interviews

Interviews were also used in this research. Interviews are a data collection technique that involves oral questioning of respondents either individually or as a group. Interviews were suitable because the researcher probed for more specific answers and the researcher would repeat a question when the response indicates that the respondents had misunderstood the question. In the interview technique the researcher randomly selected eleven (11) pupils with disabilities from the sample to interview and one (1) mathematics teacher. The technique therefore had a total of twelve (12) interviewees. Interviewees were asked structured questions similarly to those used in the questionnaire. The researcher filled in information emanating from interviews in spaces provided on the data form which had questions spelled-out.

Interviews yielded a good percentage of returns as they were done orally. Interviews were an ultimate test to verify the questions raised in the questionnaire method. It provided a good method of safeguarding validity of facts put across in the questionnaire. Here, interviewees were being asked and responded to directly to the researcher. This enabled clarification on anything which was not clear. As a result this brought about better understanding between the interviewees and interviewer. Interviews were useful to discover how individuals think and feel about a topic and why they hold certain opinions. Interviews helped in sensitive topics which people may feel uncomfortable discussing in a focus group. Detailed information about personal
feelings, perceptions and opinions were obtained. More detailed questions were asked during interviews. Ambiguities were clarified and incomplete answers followed up. According to Best and Kahn (1993), data collected by interviews is likely to be more correct compared to the other methods that are used to collect data.

According to Best and Kahn (1993), the purpose of interviewing is to find out what is in or on someone else’s mind. There are different types of interviews for example the informal conversational interview, interview guide approach, standardised open-ended interview and closed fixed response interview. In this research, the interview guide approach was used. In the interview guide approach, topics and issues to be covered are specified in advance, in outline form. The interviewer decides sequence and wording of questions in the course of the interview. This type of interview was chosen because the outline increases the comprehensiveness of the data and makes data collection systematic for each respondent. According to Best and Kahn (1993), interview guide approach makes logical gaps in data to be anticipated and closed.

In this study the researcher observed that interviews were very time-consuming since they needed interviewing, transcribing, analysing feedback and reporting. Interviews required more energy as there was need of much talking and listening. Volume of information was too large and was difficult to transcribe and reduce data. However the researcher took her time talking and listening so as to get all the important information she wanted.

3.5.3 Focus group discussion
In a focus discussion group, an interview was conducted involving five respondents in an unstructured and natural way where the participants were free to express ideas and concerns. A focus group is a type of qualitative research in which a group of people discusses their perceptions, opinions, beliefs and attitudes towards a topic. In this research, teachers in the mathematics department at Danhiko Secondary School discussed the difficulties faced by pupils with disabilities in the learning of mathematics. Discussions were also done by five pupils from the sample.
The face-to-face involvement of the researcher and respondents ensured that the conversations were always on track and encourage participant’s engagement without one individual dominating the discussion. The ability of group participants to interact with each other was very important as they shared their experiences in as far as mathematics is concerned. When participants are stimulated to discuss, the group dynamics can generate new thinking about a topic which resulted in a much more in depth discussion. The researcher interacted with participants, posing follow-up questions or ask questions that probe more deeply. The results are easier to understand. The researcher was able to get information from non-verbal responses, such as facial expressions or body language. In focus group discussion, information is given quickly. Focus groups tend to become influenced by one or two dominant people in the session, thus making the output biased. In this research, the researcher controlled the discussions such that there was no one dominating in the discussions.

3.5.4 Document analysis

Existing records often provide insights into a setting and/or group of people that cannot be observed or noted in another way. This information can be found in document form. Lincoln and Guba (1985) defined a document as any written or recorded material not prepared for the purposes of the evaluation or at the request of the inquirer. According to Lincoln and Guba (1985), documents can be divided into two major categories; public records and personal documents. In this research, the researcher collected data from the social record books which are usually done and kept by the class teacher. She also analysed the record of marks for ordinary level pupils. In document analysis, the researcher found out from the social record book those pupils with disabilities and the type of disability. The researcher compared the performance of pupils with disabilities with those without disabilities in order to find out if this poor performance is mainly found among pupils with disabilities. The researcher found it easy to find the documents as they were locally available and was inexpensive as there was no cost for documents. The documents provided opportunity for study of trends over time. The documents were easy to interpret as language used was very clear to understand.
3.5.5 Observations

Observational techniques are methods by which an individual gathers first hand data on programs, process or behaviours being studied. They provide the evaluators with an opportunity to collect data on a wide range of behaviours, to capture a great variety of interactions and to openly explore the evaluation topic. According to Simpson and Ormond (2000), by directly observing operations and activities, the evaluators can develop a holistic perspective that is an understanding of the context within which the project operates. Observation approaches also allow the researcher to learn about things that participants or staff may be unaware of or that they are unwilling or unable to discuss in an interview or focus group. Observations exist in natural, unstructured and flexible setting. An observation provides good opportunities for identifying unanticipated outcomes.

There are so many advantages of doing observations. The most important being that of direct observations providing direct access to the social phenomena under considerations instead of relying on some kind of self-report, such as asking people what they would do in a certain situation. According to Peter (1998), these principles of observations avoid the wide range of problems associated with self report. In an interview situation or response to a questionnaire item, for example a person may not always provide accurate or complete information or they might answer in ways that corresponds to what is socially desirable. There is a recognized source of bias in self report techniques referred to social desirability set which means that in many spheres of social life there are socially desirable ways of behaving and consciously or unconsciously individuals will tend to respond in that way, although in the real world they might behave differently.

Observations can take diverse forms from informal and unstructured approaches through to tightly structured, standardized procedures and can yield associated diverse types of data both qualitative and quantitative. An observation therefore is applicable in wide range of contexts. In this research, the researcher observed pupils with disabilities work and find out difficulties they face in mathematics. The researcher observed that, observations provide a permanent record much of human social behaviour that may be of interest to the research is highly transient. The fact that all observations entail some form of recording means that it provides a permanent
record of such events or behaviour, thus allowing further recording means it provides a permanent record of such events or behaviour, thus allowing further analysis or subsequent comparison across time or location to be carried out.

The researcher considered that using more than one technique of data collection is seen as highly desirable as an overarching research strategy. Therefore, the strength of observations is that it can effectively complement other approaches and thus enhance the quality of evidence available to the researcher. Qualitative research uses observations as the data collection methods. According to Vaus (2001), observation is the selection and recording of behaviour of people in their natural environment. Observations are useful for generating in-depth descriptions of organizations or events for obtaining information that is otherwise inaccessible and for conducting research when other methods were inadequate. In this research, the researcher observed the difficulties faced by pupils with disabilities in the learning of mathematics as the researcher was teaching these pupils. It was easy to observe the difficulties.

A direct observation reduces distortion between the observer and what is observed. According to Vaus(2001), observations occur in a natural setting not a laboratory or controlled experiment. The context or background of behaviour is included in observations of both pupils and their environment. The researcher made the observations whilst teaching the inclusive classes at Danhiko Secondary School. Since the researcher is a mathematics teacher at Danhiko Secondary School, it was easy to do the observations in a natural setting.

3.6 The pilot study
The pilot study was used to determine the effectiveness of the research instruments. The pilot study is a small scale study, run on trial basis which was designed to prepare for the main study. This had the effect of putting on trial research aims, instruments and methods of data analysis. The pilot study helped to determine the effectiveness and reliability of the questionnaire in relation to wording, length and clarity of instructions. These aspects were discussed with the respondents. A deliberate effort was made to make the questionnaire as simple as possible without compromising the key facts and terminology that would enable accurate fails to be got. The pilot study was carried out at Danhiko Vocational Centre, where there are pupils with disabilities who have completed secondary level, usually at Danhiko Secondary School.
3.7 The validity and reliability of data collection instruments
Data collection instruments used in this research have alternative forms. Observations may be participant or non-participant while interviews may be structured, semi-structured or unstructured. Despite this variety there are some basic principles which apply to all data collecting methods. The data collection instruments used in this research were appropriate for the study and their strengths and weaknesses were described so as to justify their selection and suitability to the research. Measures taken to control the weaknesses identified were spelt out so as to ensure validity and reliability of the instruments and the data to be collected.

3.7.1 Validity
According to Evans (1997), a valid measuring instrument has been described as doing what it is intended to do that is measuring what it is supposed to measure and yielding scores whose differences reflect the true differences of the variable being measured rather than random or constant errors. In this research, all the instruments were pilot tested to check authenticity and relevance of data produced. Mathematics teachers were used to assess that the planned questionnaires and interview guides for pupil really measure what they were supposed to be measuring. Therefore, all the instruments used were found to be valid.

3.7.2 Reliability
Hudson (1981), defines reliability as the accuracy or precision of an instrument as the degree of consistency or agreement between two independently derived sets of scores and as the extent to which independent administrations of the same instrument yield the same or similar results under comparable conditions. Reliability can also be seen as an integral part of validity. Reliability pertains to the consistency or repeatability of a measure. According to Miller and Wilson (1983) reliability as the extent to which a test would give consistent results if applied more than once to the same people under standard conditions. A test-retest method was used in this research. Instruments were used with a group on two separate occasions and analysing how closely the two sets of results conform to each other. A significant correction was observed between the two sets of results with minor differences. Alternate form method was also employed where questionnaires, interviews and focus discussions were employed to sample the same data.
3.8 Summary
Chapter 3 was concerned with research methodology. The work in this chapter traced the manner in which the researcher set out to carry out the research, the research design, the research instruments, sampling, data collection plan as well as the administration of the research. Limitations, strengths and weaknesses of these aspects were discussed. The next chapter shall focus upon data presentation, data analysis and discussions.
CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND DISCUSSIONS

4.1 Introduction
Chapter four deals with data presentation, analysis and discussion. Percentage tables, bar graphs and pie charts will be used in data presentation. Data from the teacher and pupil questionnaires, interviews, observations and focus group discussion will be analysed. Document analysis will be done to the social record book and mathematics record book for pupils with disabilities.

4.2 Responses to questionnaires by the teachers.
Table 4.1 Frequency distribution of teachers who participated in the study

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of males</td>
<td>2</td>
</tr>
<tr>
<td>Number of females</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 4.1 shows that from the identified four mathematics teachers, 50% were males and 50% were also females. All of them responded to the questionnaires.

Table 4.2 Teacher questionnaire return rate

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of teachers’ questionnaire sent</td>
<td>4</td>
</tr>
<tr>
<td>Number of teacher’s questionnaire returned</td>
<td>4</td>
</tr>
<tr>
<td>Return rate</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 4.2 shows that the return rate of the teacher questionnaire was 100%. This return rate was quite favourable. The return rate was very good when one takes into consideration the fact that mathematics teachers were full time teachers who managed to spare time in-order to be involved in the study.

Table 4.3 Frequency distribution of Ordinary Level mathematics teachers by age and sex

<table>
<thead>
<tr>
<th>age group</th>
<th>number of males</th>
<th>number of females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-30</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>31-40</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>41-50</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>
Table 4.3 above and fig 4.1 below showed that the number of male teachers was two and that of female teachers was also two. The study revealed that there was gender balance among the teachers involved. The results of the study also showed that most ordinary level teachers were in the age group 31-40 (50%) while the age group 21-30 (25%) and age group 41-50 (25%). This trend was probably to be expected considering that most teachers were probably promoted to leadership posts on becoming senior teachers (around five years experience). The results on fig 4.1 revealed that the majority of the ordinary level mathematics teachers were relatively young and could have had problems with handling ordinary level classes of pupils with disabilities.

![Bar graph showing frequency of Ordinary Level mathematics teachers by age and sex](image)

Fig 4.1 Bar graph showing frequency of Ordinary Level mathematics teachers by age and sex

Table 4.4 Frequency table of teachers’ academic qualifications

<table>
<thead>
<tr>
<th>Academic qualifications</th>
<th>Ordinary level</th>
<th>Advanced level</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of males.</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Frequency of females</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total frequency</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Table 4.4 above and fig 4.2 below show that 25% of the teachers did ordinary level and 75% of the teachers did advanced level. The fact that 75% of the ordinary level mathematics teachers had advanced level as their highest academic qualifications, may suggest that teachers may not be the causes of difficulties faced by pupils with disabilities in mathematics.

![Bar graph showing frequency of teachers with respect to their academic qualifications](image)

Table 4.5 Frequency of teachers’ professional qualifications

<table>
<thead>
<tr>
<th>Professional qualifications</th>
<th>Number of males</th>
<th>Number of females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diploma in education</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>B.sc maths and statistics</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>B. of education</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>B.sc computer sciences</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 4.5 above shows that 75% of the teachers were graduate teachers. This shows that there were 100% of female graduate teachers. The fact that most of the Ordinary Level mathematics
teachers were holders of appropriate teaching qualifications may mean the difficulties faced by pupils with disabilities may not have been due to lack of professionally qualified teachers. However, the study also revealed that some of the graduate teachers were teaching mathematics though they were not professionally qualified to teach mathematics.

Table 4.6 Frequency distribution of Ordinary Level mathematics teachers by sex and teaching experience

<table>
<thead>
<tr>
<th>Class interval of teaching experience in years</th>
<th>5&lt;X≤8</th>
<th>8&lt;X≤10</th>
<th>10&lt;X≤20</th>
<th>X&gt;20</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of males</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Frequency of females</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Total frequency</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 4.6 above revealed that most of the teachers are relatively experienced, 50% had more than 10 years experience. The fact that they are experienced teachers, we cannot conclude that teachers may not be accountable for difficulties faced by pupils with disabilities in mathematics. According to Marjoram (1974), experience is very important in order to motivate and teach mathematics effectively. As such, the difficulties faced by pupils with disabilities cannot be attributed to teachers’ incompetence due to lack of experience in handling classes with pupils with disabilities.

Table 4.7 Frequency of pupils who wrote Ordinary Level and the frequency of those who passed mathematics

<table>
<thead>
<tr>
<th>Year</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of pupils with disabilities who wrote mathematics</td>
<td>13</td>
<td>17</td>
<td>23</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td>Frequency of pupils with disabilities who passed mathematics</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 4.7 above and fig 4.3 below showed that on average 0 or 1 pupil with disability passed mathematics. This poor performance is significantly high. The researcher thought that there are difficulties responsible for this poor performance and hence sought to find out these difficulties.

![Bar graph showing frequency of pupils with disabilities who wrote ordinary level and frequency of pupils with disabilities who passed ordinary level](image)

4.2.1 Comments on the results by mathematics teachers
Most teachers commented that the ordinary level results for pupils with disabilities were very poor. Most pupils with disabilities got the U –grade in mathematics. The ordinary level results clearly showed that pupils with disabilities face many challenges in the learning of mathematics which resulted in poor results.

4.2.2 Possible causes of poor results
Mathematics teachers clearly indicated that most pupils with disabilities have negative attitude towards mathematics which contributed to their poor performance in mathematics. Little consensus exists in the research literature concerning the relationship between attitudes towards mathematics and achievement in mathematics as a function of many interrelated variables related to students, families and schools. Among pupil’s personality variables, attitude is regarded by
several teachers as an important key factor to be taken into account when attempting to understand and explain variability in pupil’s performance in mathematics.

Another cause indicated by teachers was that of having bad foundations. Mathematics teachers clearly highlighted that primary schools were not teaching mathematics properly. They were indicating that some primary teachers had no ordinary level passes in mathematics and were themselves afraid of mathematics and could therefore not teach mathematics concepts properly. Another cause which was indicated was that of background. Pupils who came from families where no one ever passed mathematics will automatically also think they will never pass mathematics. Therefore these pupils will have negative attitudes towards the subject hence poor performance. Pupils with disabilities need more instructional time. Mathematics teachers should take their time explaining concepts till pupils with disabilities grasp the concepts. They should also give the pupils adequate time to do the exercises they would have given them.

The hearing impaired teachers highlighted that language used in public examinations affects the hearing –impaired pupils as they would hardly understand it. They were of the idea that the papers for hearing impaired should be signed by a sign language teacher so that the pupils would understand. Word problems were a challenge to hearing impaired pupils. Special issues, such as the need for sign language instruction compounds the forces driving social exclusion. There is need for competent instruction in sign language with teachers having more than an elementary knowledge of basic sign is an example of such a complicating issue in inclusive education.

4.2.3 Comments on what can be done to improve pupils with disabilities Ordinary Level results in mathematics
Mathematics teachers indicated that pupils should change their attitudes towards mathematics and they should put more effort by practicing mathematics every day. Pupils should also be positive about mathematics and know that if others can pass mathematics, so they can also pass mathematics. Teachers should use a variety of teaching methods, do counselling to pupils so that they can build positive attitude towards the subject. Mathematics teachers should also be role models to pupils, and they should show that education is beneficial. Mathematics teachers should educate pupils with disabilities the importance of mathematics in their careers and in life in
The Hearing-Impaired teachers should be well versed in sign language. Teachers should socialize with pupils with disabilities most of their time. They should show them that they are not different from able-bodied pupils. Teachers should show pupils with disabilities love and care and they should assist them in mathematics wherever they need assistance.

**Table 4.8 Topics pupils with physical disabilities have difficulties in mathematics**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Frequency of teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geometrical constructions</td>
<td>4</td>
</tr>
<tr>
<td>Locus</td>
<td>4</td>
</tr>
<tr>
<td>Graphs</td>
<td>4</td>
</tr>
<tr>
<td>Transformations</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 4.8 above shows that all teachers, 100% showed that pupils with disabilities have difficulty understanding the above topics. This may be attributed to the fact that all the above topics need drawings and pupils with disabilities in hands, those with cerebral palsy have difficulties in writing and therefore major difficulties in drawing accurate smooth graphs, straight lines on locus and also accurate geometrical shapes. Looking at the ordinary level examination paper, graphs constitute 36% of mathematics 4008/4028 paper 2. This makes it difficult for pupils with disabilities to perform well in mathematics. Also considering that locus is a major topic in paper 2, this contributes to the poor performance in mathematics by pupils with disabilities.
Table 4.9 Comments on the teaching methods used by ordinary level mathematics teachers

<table>
<thead>
<tr>
<th>Method used</th>
<th>Frequency of teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questions and answers</td>
<td>3</td>
</tr>
<tr>
<td>Lecture methods</td>
<td>4</td>
</tr>
<tr>
<td>Demonstration</td>
<td>4</td>
</tr>
<tr>
<td>Discovery</td>
<td>1</td>
</tr>
<tr>
<td>Project</td>
<td>0</td>
</tr>
<tr>
<td>Group work</td>
<td>2</td>
</tr>
<tr>
<td>Other methods.</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 4.9 above shows that 75% of teachers showed that they made use of the question and answer, lecture and demonstration methods in their teaching. Group work was also frequently used while discovery and project work were rarely and never used, and yet Marjorm (1974), argues that research now shows that the lecture method for mathematics is in most cases a very effective method of teaching. Marjorm (1974), however states also that the mass lecture approach has its place but should be used rarely. The Curriculum Development Unit team notes that it seems most teachers tend to avoid using methods which demand a lot in terms of planning and preparation and yet these are the methods that make mathematics interesting to learn. The discovery and the project work methods demand a lot of preparation but are the best for teaching mathematics classes.

Mathematics teachers who teach hearing impaired pupils, indicated that the speech and signing was frequently used when teaching hearing impaired pupils. It was observed that uses of pictorial presentations for the hearing impaired pupils make it easy to explain concepts. Pupils with disabilities need more time for them to understand concepts, so teachers should lengthen mathematics lessons for concepts to be understood. When teachers give written work, they should allow those with disabilities who write slowly to finish up their work so that they will understand the concepts. Playing games can also be implemented in mathematics lessons. Historically, games have been used as a reward when the real work has been finished. Games can be powerful teaching and learning tools to develop conceptual understandings. Use of
technologies is essential in teaching and learning mathematics, it influences the mathematics that is taught and enhances pupils learning.

### 4.2.4 Other difficulties faced by pupils with disabilities

Mathematics teachers showed that pupils with disabilities have difficulties when it comes to measuring, plotting and drawing accurate diagrams. Pupils with disabilities grasp mathematics concepts slowly as most of them are slow learners. They also take time to finish work, their work is usually submitted late and it is very difficult at times to assess if pupils with disabilities do their own work or they will be helped by friends.

The hearing impaired pupils also face difficulties of mobility when it comes to extra lessons. The hearing impaired pupils cannot have extra lessons with any other mathematics teacher because of communication problems. They therefore, depend on their specialist teachers only. This is very difficult for them as they cannot get help from any other teacher except their teachers who use sign language. As a result when other pupils go for extra lessons during holidays the hearing impaired pupils will only have extra lessons if they find someone able to sign for them. Hearing impaired pupils also face difficulty when discussing with peers at school. Other pupils will not be able to use sign language and it will be difficult for them to explain certain concepts to them. In turn they will just write for them to copy which is not good for learning and mastery of concepts in mathematics. The researcher observed that it was also difficult for the hearing impaired pupils to search learning materials in the school library since they are not able to communicate with the librarian.

### 4.2.5 Comments on how the difficulties can be reduced

Most mathematics teachers indicated that the difficulties faced by pupils with disabilities can be reduced by using friendly teaching methods which motivate pupils into liking mathematics and understand mathematical concepts. Mathematics teachers should have remedial lessons with pupils with disabilities as most of them are slow learners. Teaching materials should be adopted towards learning mathematics. As most pupils with disabilities are slow in writing, teachers should give them adequate time to do mathematics exercises. Consultations with parents of disabled pupils should be done frequently, so that parents are advised on areas their children
need help. The teacher and parents can, together plan how to effectively help pupils needing help. Counselling should be provided to pupils with disabilities every time so that they realise they are just unique and can do anything able bodied people can do.

Table 4.10 Frequency distribution of how teachers give homework to pupils

<table>
<thead>
<tr>
<th>Time</th>
<th>Frequency of teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Everyday</td>
<td>0</td>
</tr>
<tr>
<td>Once per week</td>
<td>1</td>
</tr>
<tr>
<td>Twice per week</td>
<td>1</td>
</tr>
<tr>
<td>Not at all</td>
<td>2</td>
</tr>
</tbody>
</table>

The table 4.10 above shows that 50% of the mathematics teachers do not give homework at all. The reasons given were that pupils with disabilities were slow, therefore giving them homework was overburdening or overloading them with work. Most able-bodied pupils feel sorry for pupils with disabilities and most of the time, instead of helping them, they do the homework for them. The researcher observed that the hearing impaired pupils were not able to discuss with other peers, so giving them homework was not helping them in anyway, since they are not able to discuss with other peers. Teachers who teach hearing impaired pupils find it beneficiary for the pupils to do class work than homework and therefore they do not give them homework. As a result, lack of home work may contribute to difficulties faced by pupils with disabilities in the learning of mathematics. 25% of the teachers indicated that, usually they give homework once a week. These teachers also indicated that usually they give the homework on a Friday and pupils do the homework over the weekend. Mathematics teachers highlighted that over the weekend pupils have enough time to get assistance from their peers and if concepts are explained by peers they are more understood than explained by the teacher. Those who are slow in writing will have time to do the work at their own pace. 25% of the teachers also pointed out that they gave homework twice a week. Explaining how they give them, they indicated that they give the homework on Monday and homework should be submitted on Thursday. On Friday the teacher will give them homework which will be handed on Monday. Doing so gives pupils with disabilities adequate time to do their homework.
According to Rourke (1989), the basic objectives of assigning homework to pupils are the same as schooling in general to increase the knowledge and improve the abilities and skills of the pupils. However, mathematics teachers at Danhiko Secondary School see homework as rote or, grind work designed to take up the pupil’s time, without offering tangible benefit. That’s the reason why they do not give homework frequently. Usually homework is designed to reinforce what pupils have already learned, prepare them for upcoming complex or difficult lessons, extend what they know by having them apply it to new situations or to integrate the abilities by applying many different skills in a single task. Homework also provides an opportunity for parents to participate in their pupils’ education. Lack of homework, contribute to pupils’ poor achievement in mathematics as there is a positive interaction between the amount of homework which is done and pupil achievement.

4.2.6 How mathematics teachers accommodate pupils with disabilities in mathematics lessons

Mathematics teachers at Danhiko Secondary School in Harare indicated that they try by all means to accommodate pupils with disabilities in mathematics lessons. Firstly, the sitting arrangement in a class is organised in such a way that those with hearing disabilities are positioned in front. Those on wheelchairs are positioned where they will easily move in and outside the classroom. The pupils with disabilities who write using legs are also positioned where they will be free to write legibly. The sitting arrangement is user friendly to pupils with disabilities.

The mathematics teachers also highlighted that during the mathematics lessons, those with oral speech problems, are given time to express themselves. The teachers also try by all means to slow the pace of teaching so as to accommodate those who are slow learners as well. Those with physical disabilities who are slow in writing are given adequate time to get over activities. Teachers said they help by slowing down the pace of their delivery, maintaining normal timing phrases and giving information in discrete segments. The mathematics teachers indicated that slowing down of verbal information is important when asking questions, giving directions, presenting concepts and during lessons. Slowing down, enables pupils with disabilities to grasp concepts easily. Mathematics teachers said they usually motivate pupils with disabilities during
lessons by giving positive comments when they participate in lessons. Even in their exercises books, the teachers indicated that they always write positive comments which they think will motivate them.

4.3 Responses from pupil questionnaires, focus group discussion and interviews

Table 4.11 Frequency distribution of pupils with disabilities who participated in the study

<table>
<thead>
<tr>
<th>Number of boys</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of girls</td>
<td>11</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>

Table 4.11 shows that from the identified pupils with disabilities who were given questionnaires, nine (9) boys participated in the study and eleven (11) girls also participated.

Table 4.12 Pupil questionnaire return rate

<table>
<thead>
<tr>
<th>Number of pupil given questionnaires</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of pupils who returned questionnaires</td>
<td>19</td>
</tr>
<tr>
<td><strong>Return rate</strong></td>
<td><strong>95%</strong></td>
</tr>
</tbody>
</table>

Table 4.12 shows that the return rate of pupil questionnaire was 95%(19 out of 20). This return rate was quite favourable. Most pupils returned the questionnaires. The researcher is the Head of Department of mathematics and usually helped in problems encountered at school which involves mathematics. Therefore pupils with disabilities returned the questionnaires, hoping and trusting that their difficulties will be solved and the researcher will try to give intervention strategies to the difficulties.
Table 4.13 Frequency distribution of ordinary level pupils by age and sex

<table>
<thead>
<tr>
<th>Age group</th>
<th>Number of boys</th>
<th>Number of girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 years and below</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>13-15 years</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>16-18 years</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>18 years and above</td>
<td>5</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>11</td>
<td>19</td>
</tr>
</tbody>
</table>

Table 4.13 above and fig 4.4 below show that the number of girls was eleven (11). The study showed that most ordinary level pupils with disabilities were in the age group of above 18 years, 63% while the age group of 16-18 years comprised 26% and in the age group 13-15, 11%. This trend was probably to be expected considering that most pupils with disabilities do not mature respective of their ages.

Fig 4.4 Bar graph showing frequency of ordinary level pupils with disabilities by age and sex
Table 4.14 Frequency distribution of ordinary level pupils by their forms

<table>
<thead>
<tr>
<th>Form</th>
<th>Number of boys</th>
<th>Number of girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>11</td>
<td>19</td>
</tr>
</tbody>
</table>

Table 4.14 shows that 37% of pupils who responded to questionnaires were in Form Three in 2013 and also 63% were in Form Four. It was observed that those pupils who were in Form Four could clearly highlight the difficulties they face in the learning of mathematics at ordinary level as they have completed three years of the ordinary level. The Form Threes helped in highlighting the difficulties faced by pupils with disabilities in the learning of mathematics, which the Form Fours may have forgotten because of time.

Fig 4.5 Bar graph showing frequency of ordinary level pupils with disabilities by their forms.
Table 4.15 Frequency of type of disabilities

<table>
<thead>
<tr>
<th>Type of disability</th>
<th>Frequency of pupils</th>
<th>Percentage of pupils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autism</td>
<td>2</td>
<td>10.5</td>
</tr>
<tr>
<td>Hearing Impaired</td>
<td>5</td>
<td>26</td>
</tr>
<tr>
<td>Mentally Impaired</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Multiple handicaps</td>
<td>2</td>
<td>10.5</td>
</tr>
<tr>
<td>Physically Impaired</td>
<td>10</td>
<td>53</td>
</tr>
<tr>
<td>Visually Impaired</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Fig 4.6 Pie chart showing types of disabilities and their frequencies at Danhiko Secondary School.

From table 4.15 above and fig 4.6 below there are no pupils with visual impairment at Danhiko Secondary School because these pupils need to be aided in order to perform their work. Also
there are no pupils who are mentally handicapped, these pupils need close monitoring every time and therefore they are not enrolled at Danhiko Secondary School. These pupils are often neglected and often hidden in homes. They are often considered stupid and senseless and their parents do not educate them. From the table 53% of the pupils have physical disabilities, these pupils have different physical disabilities but they are all able to move, bath and use toilet on their own, since these are the conditions considered for enrolment at Danhiko Secondary School. 26% of the pupils have hearing impairment, these pupils can do what all other pupils can do. They are as competitive as non-disabled pupils. Autism and multiple handicaps have 10.5% each. Their disabilities depends on how severe it is for them to be enrolled at Danhiko Secondary School.

Table 4.16 Frequency distribution of mean marks obtained in mathematics tests as percentages

<table>
<thead>
<tr>
<th>Class interval of mean mark</th>
<th>Frequency of boys</th>
<th>Frequency of girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0&lt;x≤10</td>
<td>3</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>10&lt;x≤30</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>30&lt;x≤50</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>50&lt;x≤70</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>70&lt;x≤100</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>11</td>
<td>19</td>
</tr>
</tbody>
</table>

Table 4.16 above and fig 4.7 below shows that pupils with disabilities perform poorly in mathematics tests. 42% of the pupils indicated that their mean marks for this year tests was in the range 0 < x ≤ 10 which is far below average. Another 42% indicated that their mean marks for this year test was in the range 10 < x ≤ 30 which is still in the U-grade. That is 84% of pupils with disabilities indicated that their performance in mathematics is in the U-grade while 11% of pupils were in D-grade and E-grade. That is 95% of pupils with disabilities were in the failing grade. This poor performance shows that they face challenges in mathematics which needs quick attention. Only 0.5% of the pupils with disabilities were in the passing range of C-grade. This may mean that the disability of the pupil concerned does not affect his/her performance in
mathematics. According to Rourke (1989), mathematics is critical to the study of any subjects at school, indeed historically the development of science, technology engineering and mathematics has often go hand in hand.

Fig 4.7 Bar graph showing performance of pupils with disabilities in mathematics tests

<table>
<thead>
<tr>
<th>Rating</th>
<th>Frequency of pupils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very poor</td>
<td>8</td>
</tr>
<tr>
<td>Poor</td>
<td>8</td>
</tr>
<tr>
<td>Average</td>
<td>2</td>
</tr>
<tr>
<td>Good</td>
<td>1</td>
</tr>
<tr>
<td>Very good</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 4.17 How pupils with disabilities rate their performance in mathematics

Table 4.17 above and fig 4.8 below show that 84% of pupils with disabilities rate themselves as poor and very poor. This clearly shows that they have rated themselves to low grade and because they see themselves that way, it clearly indicates that they would not put extra effort in mathematics. Their poor performance may be due to difficulties they face in mathematics. Only
0.5% indicated that they are good at mathematics. This clearly shows that minority of pupils with disabilities are good in mathematics. 11% indicated that they were average performers. Usually average performers cannot be relied upon as when the paper is difficult they will fail and when it is cheap they might get average marks. A high achievement in mathematics is a function on many interrelated variables related to pupils, families and schools. Among pupil’s variables, attitudes are regarded by several researchers as an important key factor to be taken into account when attempting to understand and explain variability in student’s performance in mathematics. Fraser and Kahle (1988), highlighted that learning environments at home, at school and within the peer group accounted for a significant amount of variance in students attitudes and furthermore, that class ethos had a significant impact on the scores achieved by pupils with disabilities.

Fig 4.8 Pie chart showing how pupils with disabilities rate their performance in mathematics
Table 4.18 View of mathematics as a subject by pupils with disabilities

<table>
<thead>
<tr>
<th>View</th>
<th>Frequency of pupils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very difficult</td>
<td>11</td>
</tr>
<tr>
<td>Difficult</td>
<td>7</td>
</tr>
<tr>
<td>Neutral</td>
<td>1</td>
</tr>
<tr>
<td>Easy</td>
<td>0</td>
</tr>
<tr>
<td>Very easy</td>
<td>0</td>
</tr>
</tbody>
</table>

From table 4.18 above and fig 4.9 below we observe that 58% (11 out of 19) of pupils view mathematics as a very difficult subject. From the interview most pupils acknowledges that mathematics is an important subject. Pupils said that mathematics is difficult because it is a series of arbitrary rules handed down by the teacher, who in turn got them from some very smart source.

Fig 4.9 Pie chart showing pupils with disabilities’ views on mathematics
Table 4.19 Comment on the teaching methods used by ordinary level mathematics teachers

<table>
<thead>
<tr>
<th>Methods used</th>
<th>Frequency of pupils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questions and papers</td>
<td>19</td>
</tr>
<tr>
<td>Lecture method</td>
<td>15</td>
</tr>
<tr>
<td>Demonstration</td>
<td>17</td>
</tr>
<tr>
<td>Discovery</td>
<td>0</td>
</tr>
<tr>
<td>Project</td>
<td>0</td>
</tr>
<tr>
<td>Group work</td>
<td>10</td>
</tr>
<tr>
<td>Other methods</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 4.19 above shows that most pupils indicated that most teachers made use of the question and answer method. Lecture, demonstration methods were also frequently used by mathematics teachers. Group work was also indicated by pupils that it was being used by mathematics teachers in the teaching of mathematics. Project and discovery was never used in mathematics lessons as indicated by pupils, whilst according to Rourke (1989), good mathematics teaching often involves pupils moving around the classroom or school building, talking, arguing and generally making more noise than mathematics classes of the past. The researcher noted that, pupils were of the idea that if use of technology is engaged it will help them. Also pupils pointed out that use of the internet can be valuable teaching resources. Pupils with disabilities were advocating for the use of computers as they were of the idea that a computer is a patient teacher and it is interesting to observe some pupils who will stay with a game well beyond the time they might usually stay with a pen and paper exercise.

4.3.1 Comment on attitudes of pupils with disabilities towards mathematics

From the interviews, focus group discussion held, the researcher noticed that pupils with disabilities feel that as long as they are not able to draw accurate graphs, loci, geometrical constructions and any mathematical diagram, their competence in mathematics will not be high as these topics cover 50% of the mathematics 4008/4028 paper 2 which is done at Danhiko Secondary School. Pupils with disabilities also showed that even if they knew the topics quite well, as long as the graph is not accurate, the answers for the questions based on those graphs would not be correct and hence this would affect their marks and their pass rate in mathematics.
4.3.2 Comment on performance of pupils with disabilities in mathematics
From the pupil questionnaires it was seen that most pupils were performing poorly in mathematics tests. This was seen on their marks for this year. Their marks showed that they have difficulties they face in mathematics. From the document analysis, it was observed that most pupils with disabilities have low marks compared with their counterparts without disabilities.

4.3.3 Pupils’ opinions on what can be done to reduce the difficulties
Most pupils indicated that if they are allowed to use computers in the examinations, it will be easy for their work to be read easily and also it will be easy for them to draw graphs smoothly. Others indicated that if mathematics has option papers and the other paper comprised of graphs and diagrams, then pupils with disabilities would have a choice on the papers. Teachers may help them choose suitable papers. Pupils with disabilities clearly indicated that they should not be limited on time when writing Zimbabwe School Examinations, as most of them do not finish the examinations. This results in them failing the examinations. The researcher noted that this is a difficulty they face when writing mathematics examinations.

4.4 Responses from the focus group discussion and interviews by mathematics teachers
From the focus discussion which was organised by the mathematics department at Danhiko Secondary School, the following were observed to be the main problems faced by pupils with disabilities in the learning of mathematics.

4.4.1 Attention difficulty
The mathematics teachers pointed out that mathematics requires a great deal of attention particularly when multiple steps are involved in the problem solving process. During instruction, the researcher observed that pupils who have attention problems often miss important pieces of information. Without such information pupils have difficulty trying to implement the problem solving processes they learn. The researcher also observed that most pupils with disabilities often use toilet frequently. Therefore they move in and out of classrooms. This makes them miss other important information. Mathematics teachers said pupils with attention difficulties may be unable to focus on the important features that make a mathematical concept distinct. For example when teaching geometric shapes these pupils may attend to features not relevant to identifying
shapes. Instead of counting the number of sides to distinguish triangles from rectangles, the pupils may focus on size or colour. Using visual, auditory, tactile (touch) and kinaesthetic (movement) cues to highlight the relevant features of a concept is helpful to pupils with disabilities.

4.4.2 Memory difficulty
Mathematics teachers indicated that most pupils with disabilities have memory problems. Memory deficits play a significant role in most of these pupils. The memory problems are not evident when pupils demonstrate difficulty remembering their basic addition, subtraction, multiplication and division facts. Memory deficits also play a significant role when pupils are solving multi-step problems and when applying problem solving strategies. A common misconception about memory problems of these pupils is that information never gets stored properly. The teachers indicated that, this belief probably arises because one day the pupil can do mathematics tasks but next day they cannot.

4.4.3 Low level of academic achievement
Mathematics teachers indicated that pupils who experience mathematics failure often lack basic mathematics skills. It takes pupils with disabilities a longer time to process visual and auditory information than typical learners, they often never have enough time or opportunity to master the foundational concepts/skills that make learning of higher level mathematics possible. The teachers suggested that providing pupils with disabilities many opportunities to respond to mathematics tasks and providing practice opportunities in a variety of ways is essential if pupils with disabilities are to ever master the mathematics concepts/skills taught. Additionally mathematics teachers need to plan periodic review and practice exercises of concepts/skills that pupils have previously mastered.

4.4.4 Slow learners
Mathematics teachers indicated that most pupils with disabilities are slow in most of their activities. These pupils with disabilities who are slow in most activities are often not active learners. They do not actively make connections between what they already know and what they are presently learning. Mathematics teachers highlighted that when presented with a problem-
solving situation, pupils with disabilities who are passive learners do not employ strategies or active prior knowledge to solve the problem. Therefore they face difficulties in the learning of mathematics, as mathematics is hierarchical that is concepts are built on other concepts.

4.4.5 Mathematics anxiety
In the focus discussion, mathematics teachers highlighted that pupils with disabilities often approach mathematics with trepidation, because mathematics is difficult for them, mathematics time is often an anxiety-ridden experience. The best cure for mathematics anxiety is success. Providing success starts first with the teacher. By understanding why pupils are having the difficulties they are having, mathematics teachers are less inclined to place the blame on the pupils for their lack of mathematics success. These pupils already feel they are not capable. The attitude with which teachers approach these pupils can be crucial first step in rectifying the mathematics difficulties they are having. Mathematics teachers indicated that they should provide pupils with disabilities with non-threatening risk-free opportunities to learn and practice mathematics. Mathematics teachers also indicated that they should celebrate both small and great advances which are important. They indicated that they should also provide instruction that is effective for these pupils to learn mathematics, thereby helping them to experience the success they deserve. Mathematics teachers during focus discussion indicated that pupils who experience continuous failure in mathematics expect to fail. Their lack of confidence compels them to rely on assistance from others to complete tasks such as worksheets assistance that only helps the pupils get through the current set of problems or tasks and does not include re-teaching the concept/skill, only reinforces the pupil’s belief that they cannot learn mathematics.

4.4.6 Cognitive/meta-cognitive thinking deficits
Meta-cognition has to do with pupil’s ability to monitor their learning. Mathematics teachers agreed that most pupils with disabilities are not able to monitor their learning. They are not able to evaluate whether they are learning. They are also not able to employ strategies when needed and they do not know whether a strategy is successful or not and they are not able to make changes when needed. These skills are essential skills for any problem solving situation, because mathematics is largely a problem solving activity. Pupils who are not meta-cognitively adept will have great difficulty being successful with mathematics. Such pupils need to be explicitly taught
how to be meta-cognitive learners. Teachers who teach problem solving strategies, who reinforce pupils’ use of these strategies and those who teach pupils to organise themselves so they can access strategies, will help pupils with disabilities who have meta-cognitive deficits become meta-cognitive learners.

4.4.7 Graph drawing difficulties
Mathematics teachers have observed that most pupils with disabilities that involve shaking of hands, those who do not have hands, who use legs in writing and those who have no fingers and those with cerebral palsy face difficulties when drawing graphs. Because they cannot write well, it is very difficult for them to produce an accurate graph. Failure to produce accurate graph will definitely mean failure to answer and get correct answers on all questions as they will be based on the graph. Looking at the mathematics paper 4008/4028/2 most of the questions in section B are graphs. Considering these pupils it will be very hard for them to get any mark on any question which requires graph drawing. This also contributes to the difficulties faced by pupils with disabilities in the learning of mathematics and therefore contributes to the poor performance in mathematics by pupils with disabilities.

4.4.8 Locus and constructions
Locus and constructions require pupils to accurately construct angles and diagrams. Locus usually is a drawing which shows the position of certain points on a diagram. Pupils with disabilities, usually those who are not able to draw graphs, are not also able to do locus and constructions accurately. Since locus and constructions is also another question in the mathematics paper 4008/4028/2 usually found in section A, it will be very difficult for pupils with problems of drawing to get any mark on locus and constructions, considering the marks these pupils may lose not because they do not know how to do it but because of their disability, they are not able to produce accurate things. Therefore this is a very challenging difficulty faced by pupils with disabilities. Their choices of questions are also limited considering that, they will not choose all graphs.
4.4.9 Time allocation problem
From the discussions, the researcher noticed that teachers were not happy with 20 percent extra time allocated to pupils with disabilities during their final Zimbabwe School Examinations. Teachers were of the idea that the time allocated should depend on the nature of the pupil’s disabilities as some disabilities do not affect speed in writing and others are very slow in writing. The time allocation to papers is also another difficulty faced by pupils with disabilities which may compromise their performance in mathematics.

4.4.10 Attitude of mathematics teachers to pupils with disabilities
Mathematics teachers clearly highlighted their attitudes towards pupils with disabilities or towards inclusive education. Teachers said that they faced increased pressure as their roles diversify, compared to non-inclusive classes. Teachers also face pressure of adjusting their teaching styles in accordance with the multiplicity of learning styles they face. Teachers are required to be psychologically and practically prepared to take on the dynamic role of inclusive education while being aware that making physical provision for pupils with disabilities is not as important as making attitudinal changes resulting in the removal of barriers to physical and educational access.

The teachers interviewed by the researcher pointed out that the experience of being an inclusive teacher is challenging enough to make them become physiologically and psychologically stressed. On the other hand teachers see it as an opportunity for personal and professional growth while contributing to the dynamic field of education. It appeared that the attitudes of teachers towards inclusion of pupils with disabilities are multidimensional and complex positive attitudes are considered to encourage the inclusion of pupils with disabilities into regular classrooms, while negative attitudes support low achievement and poor acceptance of pupils with disabilities into main stream settings. The poor motivation of the teachers that qualify to handle children with special needs also contribute much towards how the teachers handle inclusive classes. Little has been done by the government to motivate teachers who qualify with skills in special needs education, handling children with special needs comes with extra work. At one time the government had offered top-ups to teachers handling pupils with disabilities this has never been implemented. What happens, many of these teachers, since they have skills to handle both
classes in the regular as well as special needs education, they chose to concentrate only on the former and abandon the latter.

4.4.11 Possible causes of poor performance in mathematics by pupils with disabilities

From the discussions with the mathematics teachers, causes of poor performance in mathematics by pupils with disabilities are so diverse. Some of the causes suggested by the teachers were that pupils with disabilities lack the ability to translate mathematical meaning to real-world meaning. They cannot link what they have learned with real-world problems and therefore they cannot answer questions correctly. Pupils who are skilled at mathematics might have trouble seeing how to relate mathematical process to a real world context. Pupils with disabilities lack confidence in mathematics. Lack of confidence usually results in poor performance.

Mathematics teachers pointed out that those pupils with disabilities lack the ability to make approximations or estimations. This cost them in many problems which require approximations and estimations. Pupils with disabilities lack multi-step problem solving skills and therefore they cannot answer any problem which requires problem-solving skills. These pupils also have no time to practice their work. Mathematics needs a lot of practice for mastering of concepts/skills. The other reason why pupils with disabilities perform poorly in mathematics is that they lack mathematical interest in mathematics. They do not spend their time doing mathematics and mathematics requires interest and practice so as to achieve positive results.

4.4.12 What can be done by the school to improve the results of pupils with disabilities in mathematics?

During the focus discussion group, the mathematics teachers suggested that schools should enrol a manageable number of pupils with disabilities since teacher/pupil ratio of pupils with disabilities is low. This would increase teacher-pupil interactions and therefore improve the performance. The school can also introduce the use of technology that is the use of computers so that pupils can take their time doing work on e-learning on their own pace.
4.4.13 What can be done by pupils to improve results in mathematics?
Mathematics teachers were suggesting that pupils on their own should put extra effort in mathematics by practicing mathematics daily by doing discussions and by helping each other. Pupils can do collaborative learning whereby they will be teaching each other as indicated in the literature review. Pupils can develop interest and confidence in mathematics so as to improve their results. In addition to that they can develop the attitude that what they have mastered, they should be able to do it at any given time. They should keep on practicing what they have mastered so that they will not forget. Pupils should have positive attitude towards mathematics and this positive attitude reflects a positive emotional disposition. The emotional dispositions have an impact on an individual’s behaviour as one is likely to achieve better in a subject that one enjoys has confidence in or finds useful.

4.4.14 What Zimbabwe School Examination Council can do to improve the results?
From the focus discussion group and interviews with mathematics teachers, the Zimbabwe School Examination Council can do a lot to improve pupils with disabilities’ performance in mathematics. Firstly the extra time should depend on the nature of disability or pupils with disability should be allowed to write till they finish the paper. The Zimbabwe School Examination Council should train markers to mark pupils with disabilities’ papers especially those who do not write eligibly. The Zimbabwe School Examination Council could allow those who are not able to write properly to use computers to write the examinations.

4.5 Results from document analysis
The researcher analysed the social record book from the respective class teachers of Form Three and Form Four pupils. The social record book for the hearing impaired class was also analysed. The mathematics record of marks, books for classes involved in the research were also analysed. The information obtained is presented and analysed below.

4.5.1 Analysis of the social record books
The researcher analysed the social record books for all pupils in Form Three and Form Four. The researcher noted that most pupils with disabilities come from single parent families. The reasons highlighted were that the father ran away when the mother gave birth of a disabled child. Therefore the pupils may not have guidance and encouragement from the parents. It was also
noted that most pupils with disabilities stay with their grandparents who are old and may not be aware of the importance of education and may not encourage their grandchildren to work hard in mathematics. Most pupils at Danhiko Secondary School were born with the disabilities, very few were involved in accidents. In the social record books, there was evidence that most pupils with disabilities were sponsored in terms of school fees and other equipments like wheelchairs. The researcher noted down the names of those pupils with disabilities and then verified their performance in the mathematics record books of their respective mathematics teachers. The researcher noted that performance of pupils with disabilities was low compared to their normal counterparts without. This difference noted maybe due to the difficulties they face in the learning of mathematics.

Table 4.20 Analysis of mathematics record of marks for pupils with disabilities

| Topic               | A | B | C | D | E | F | G | H | I | J | K | L | M | N | P | Q | R | S | T |
| Equations           | 50| 58| 47| 56| 48| 49| 40| 50| 52| 42| 45| 46| 68| 62| 51| 41| 38| 43| 62|
| Transformations     | 02| 04| 06| 08| 10| 01| 03| 05| 33| 07| 02| 01| 42| 38| 02| 02| 01| 02| 03| 35|
| Indices and Logarithms | 56| 60| 48| 51| 47| 52| 48| 52| 52| 46| 45| 47| 61| 58| 50| 42| 48| 50| 41|
| Quadratic graphs    | 02| 11| 10| 09| 07| 01| 00| 13| 23| 01| 02| 03| 42| 22| 01| 00| 02| 03| 40|
| Locus               | 04| 08| 07| 08| 06| 01| 01| 11| 32| 02| 04| 08| 40| 28| 03| 02| 01| 01| 33|
| Matrices            | 52| 51| 47| 52| 36| 50| 46| 53| 58| 49| 47| 48| 61| 50| 52| 40| 41| 42| 63|
| Cubic graphs        | 03| 06| 05| 03| 01| 03| 05| 33| 07| 02| 01| 42| 38| 02| 01| 02| 03| 03| 35|
| Vectors             | 51| 50| 38| 54| 39| 41| 41| 47| 53| 48| 47| 46| 57| 50| 40| 38| 39| 42| 53|
| Cubic graphs 2      | 48| 51| 46| 52| 47| 50| 48| 48| 50| 49| 41| 42| 61| 60| 43| 47| 48| 46| 50|
| Cumulative frequency curve| 01| 02| 03| 04| 01| 02| 02| 01| 30| 01| 02| 01| 40| 38| 02| 01| 02| 01| 30|

**KEY**

Red marks--------below average marks

Black marks------marks above 49 percent (average to above average marks)

Table 4.20 above shows marks obtained by pupils with disabilities in different topics in mathematics. It was observed that pupils with disabilities got below average marks on topics which required drawing of graphs or accurate diagrams. These low marks compared with their
marks on topics which do not require any drawing clearly suggested that pupils with disabilities face difficulties in drawing graphs or accurate diagrams in mathematics. From table 4.20 above, the topic indicated cubic graphs (2), the researcher observed that the teacher had given a test on an already drawn graph, and pupils were asked questions using the graph. It can be noted that their performance was quite good compared with other topics on graphs and locus. This also clearly indicates that pupils with disabilities face difficulties in drawing graphs and locus. However pupils with hearing impairment performed differently from those with physical disabilities in that they had no difficulties in drawing but in answering the questions.

4.6 Results from observations
During the research, it was observed that difficulties faced by pupils with disabilities in the learning of mathematics. Firstly, the researcher observed that most pupils with disabilities use the toilet frequently. This indicated that they will lose time and concentration on aspects taught during the time they are moving. Also, most pupils with disabilities receive assistance from several professionals, which means that the pupils will leave the classroom several times a day, and the pupils lose valuable instruction time during these transitions.

Secondly, the researcher observed that mathematics teachers who teach in inclusive classes were not necessarily equipped to manage the learning needs of some pupils with disabilities. Another observation made was that, some pupils with disabilities need special education classroom to get the maximum benefit of education. There are pupils who need the special education classroom where there is a small class size, limited distractions, more one-on-one instruction and an individualised academic program so that they learn the important skills that they need to be successful in mathematics. Some pupils with disabilities want to be hit hard in terms of mathematics practice, reading, writing and all other basic skills needed in mathematics. In an inclusive classroom, most pupils with disabilities are not able to get maximum academic intensity.

Another observation was that most pupils with disabilities when in an inclusive class, had low self-esteem and a low self-concept which was clearly indicated in literature review that it affects pupils’ performance in mathematics. Also pupils with disabilities when in inclusive classrooms, see what their peers can do, and what they cannot. As a result they often feel depressed,
overwhelmed and academically inadequate compared to their non-disabled classmates. The researcher observed pupils with disabilities during normal lessons when they were doing topics on graphs. The researcher observed that most pupils with physical disabilities could not draw smooth, accurate graphs, hence they were not able to answer questions based on the graphs they had drawn accurately. The researcher noted that this was one of the major difficulties faced by pupils with disabilities in the learning of mathematics.

When the researcher observed the mathematics lessons for hearing impaired classes, there was an observation that there was communication breakdown between the teachers and the pupils. It was observed that, all teachers who teach hearing impaired classes had special education degrees but they are not able to use sign language appropriately. When the researcher observed the lessons and then observed the pupils doing work they were given as written exercise, it could be seen that the pupils had not grasped the concepts taught due to communication problems. Therefore to the hearing impaired pupils, communication is the major difficulty they face in the learning of mathematics.

4.7 Summary
In this chapter data collected in the research study was presented, analysed and discussed. Various forms of data presentation were made use of. In the majority of cases frequency distributions were calculated and converted to percentages. Together, with frequency tables, pie charts and bar charts were used in data presentation. Discussions on the bearing of the statistics were made. The main recommendations and conclusions of the study are presented in chapter five.
CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction
In chapter four data collected in the research study was presented, analysed and discussed. Chapter five is concerned with summarizing the study. At the same time, the chapter comes up with conclusions and recommendations.

5.2 Summary of the research
The main research question sought to find out the major problems faced by pupils with disabilities in the learning of mathematics. Both teachers and pupils with disabilities revealed that geometrical constructions, locus and all graphs were major topics which pupils with physical disabilities find difficult to understand. The hearing impaired classes experience difficulties in communication and limited vocabulary in sign language.

Sub-question 1, research results points to the fact that the use of ineffective teaching methods may be causing the difficulties faced by pupils with disabilities. The researcher observed that, when teachers use the methods that do not cater for individual differences, pupils with disabilities do not grasp the concepts and when they fail in class they find mathematics a very difficult subject.

The second sub-question, research results indicated that the pupil/book ratio is 1:1 in mathematics. It could therefore not possible to say inadequate textbooks made it difficult for pupils with disabilities to learn mathematics. Also the research results revealed that most teachers do not make use of Curriculum Development Unit instructional materials provided but only occasionally made use of the teaching materials they prepared. This lack of adequate instructional resource materials lead to poor lesson presentation and pupils fail to understand fundamental concepts and hence encounter problems in mathematics. The researcher also observed that there were no teaching materials used for hearing impaired pupils. The teachers suggested that if an overhead projector would be used during the lessons, it would be easier to explain concepts whilst pupils read in the textbooks.
Sub-question three, the research findings revealed that the low pass rates for mathematics with pupils with disabilities may have influence on problems faced by pupils with disabilities in the learning of mathematics.

Sub-question four sought to find out if the amount and frequency of assignments given by ordinary level mathematics teachers were adequate. The researcher observed that teachers did not give homework frequently and when pupils fail to consolidate concepts they may form negative attitudes towards the subject. Therefore the research results showed that lack of homework could possibly increase problems faced by pupils with disabilities in the learning of mathematics at ordinary level. The researcher also observed that teachers did not use games in their teaching yet Mayforth (1995), says that there is nothing that beats games in motivating pupils to love mathematics. Historically, games have been used as a reward when real work has been finished. Booker (2000),reminds that games can be powerful teaching and learning tools to develop conceptual understandings. It is engagement with interesting and fun activities that can keep a young person practising a skill well beyond what they might tolerate if asked to do another worksheet. Simple and versatile, games can provide important learning opportunities. Card games are especially useful as they are cheap, portable and socially acceptable for all ages.

Sub-question five sought to find out the topics pupils with disabilities find difficulties in, in mathematics. The research findings showed that all topics which required accurate diagrams or graphs were the major contribution to their difficulties especially to those pupils with cerebral palsy, disabilities in hands or on hands or those who have no hands at all, they could not write properly hence very difficult to produce accurate diagrams or graphs. It can be argued that most pupils with physical disabilities have difficulties in drawing accurate mathematical diagrams and graphs. The fact that most of pupils with physical disabilities could not write properly made their mathematical diagrams and graphs incorrectly and hence they failed to find accurate answers from their diagrams or graphs. This made them perform poorly in mathematics. The research showed that pupils with disabilities have major difficulties in the following topics in mathematics:

1. Geometrical constructions
   - construction of accurate angles
2. Locus

3. Graphs:
   - straight line graphs
   - quadratic curves
   - cubic graphs
   - inverse graphs
   - velocity –time graphs
   - speed-time graphs
   - distance-time graphs
   - cumulative frequency graphs
   - statistical graphs

4. Transformations
Looking at the ordinary level national syllabus, Mathematics 4008/4028 these topics cover the larger part of the papers. If pupils with physical disabilities cannot draw accurate diagrams and graphs, it is a major difficulty they face in the learning of mathematics.

The researcher observed that pupils with hearing impairment face different difficulties from those with physical disabilities. Pupils with hearing impairment experience communication breakdown with the teacher. This makes them fail to grasp mathematical concepts. The researcher also observed that pupils with hearing impairment have difficulty in sharing ideas with other pupils at school of their level, so they cannot discuss mathematics with other pupils. The results of the study showed that some pupils with hearing impairment can misinterpret concepts during the lesson, and the teacher can only note it after they have written work on the concept. The researcher noted that hearing impaired pupils also face difficulties in limited vocabulary of sign language, the same sign may mean different things and this may cause pupils not to master mathematical concepts quite well. The results of the study showed that word problems in mathematics were difficult to explain in sign language hence pupils were not
grasping the concepts. The hearing impaired pupils believe in what they see and what they can handle, mathematical concepts are very difficult to be seen or touched and this make it very difficult to explain. The researcher also observed that it was difficult for the hearing impaired teachers to explain concepts like “add this”, “sum up”, “altogether” and several similar concepts to mean the same to hearing impaired pupils. It was also difficult for the teachers to explain different concepts with sign language for example, “simplify”, “factorise”, “evaluate”, “solve” and many more. This made pupils not to understand the difference between the words and will apply wrong aspects on certain aspects. During the focus group discussion with the mathematics teachers, the hearing impaired teachers highlighted that hearing impaired pupils understands more if they are taught with the hearing impaired teacher. They trust other hearing impaired people more than non-hearing impaired people.

5.3 Recommendations

5.3.1 Heads should put into place measures that will help motivate teachers and pupils to like mathematics. The inclusive schools heads should highly motivate its teachers so that they will like their job quite well.

5.3.2 Mathematics teachers should employ teaching methods that will reduce difficulties faced by pupils with disabilities in the learning of mathematics. Mathematics teachers can employ teaching methods that are more pupil-centred such as discovery and project work.

5.3.3 Mathematics teachers should assign homework frequently so as to make pupils with disabilities practice the subject.

5.3.4 Mathematics teachers should use a variety of instructional materials for pupils to understand.

5.3.5 Teachers should fight methophobia among the learners with disabilities. This will influence a positive attitude towards mathematics.
5.3.6 The Zimbabwe School Examinations Council should consider pupils with disabilities either when setting the papers or when marking the papers on questions which need accurate diagrams and graphs.

5.3.7 Mathematics teachers who teach in inclusive schools should be trained on how to handle learners with disabilities.

5.3.8 Mathematics teachers should accommodate pupils with disabilities during the lessons. When teaching in an inclusive class, mathematics teachers should reduce their speed so that pupils with disabilities who are slow will be accommodated. The time they assign to tasks, the time they spend on individuals and also the time they give for written work should also accommodate pupils with disabilities.

5.3.9 For the pupils who are slow, illegible or includes many reversed letters, a cassette recorder or a computer with word processing software could be used for written work or tests or even Zimbabwe School Examinations Council.

5.3.10 For pupils who have difficulties in reading cursive, small, or crowded print, typed handouts, large print, or double spaced materials should be provided to help them in the learning of mathematics.

5.3.11 For pupils who have difficulties in organizing time, materials and information a variety of approaches can be used including a quiet uncluttered homework space, alarm watch, purchased texts that can be marked with a highlighter, a homework assignment diary coordinated between home and school, study skills instruction and a personally–developed date-book or scheduler.

5.3.12 Hearing impaired pupils should be taught by teachers who are trained to teach this kind of impairment as they will be able to communicate with them properly.

5.3.13 Use of technology is essential in teaching and learning of mathematics, it influences the mathematics that is taught and enhances pupils’ learning. Internet offers educators a huge range
of research-based practices, interactive websites, resources and lesson plans. A computer is a patient teacher and it is interesting to observe some pupils who will stay with a game well beyond the time they might usually stay with pen and paper exercise. Therefore use of technology, internet and computers should be advocated for.

5.3.14 The school should enrol a manageable number of pupils with disabilities, so that they will get adequate assistance from the teachers. Teacher / pupil ratio of disabled pupils should be maintained so that the teachers will not find difficulties in working with larger classes.

5.3.15 The school should introduce e-learning so that pupils will learn on their own on aspects they would not have grasped during the lessons.

5.3.16 Inclusive schools should have guidance and counselling qualified teachers to guide and counsel pupils with disabilities. The guidance and counselling teachers should teach pupils with disabilities the importance of various subjects in their career choices.

5.3.17 The Zimbabwe School Examination Council should work with relevant Non-Governmental Organizations so that they can get special help for special groups. The Zimbabwe School Examinations Council should have markers from inclusive schools to mark pupils with disabilities papers, as they are the ones familiar to the handwritings of different pupils. The Zimbabwe School Examination Council should also provide study packs, examinations hints and workshops for teachers and pupils. The 20% extra time given during examination to pupils with disabilities is not adequate as the disabilities vary from moderate to severe. The extra time should depend on the disability of pupils not just to be 20%.
5.4 REFERENCES


Yeo, R. (2005). Disability, Poverty and the New Development Agenda

A. QUESTIONNAIRE FOR TEACHERS

This questionnaire is designed for an educational research study into the causes of poor performance in mathematics by Ordinary level pupils with disabilities at Danhiko Secondary School. The information gathered will be treated with due confidentiality and used for the sole purpose of this research.

INSTRUCTIONS

TICK THE APPROPRIATE BOX AND FILL IN THE BLANKS

NB: Please do not write your name on this questionnaire

<table>
<thead>
<tr>
<th>SECTION A: DEMOGRAPHIC DATA</th>
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</thead>
<tbody>
<tr>
<td>1. AGE:</td>
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<tr>
<td>20 and below years</td>
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<tr>
<td>21-30 years</td>
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<tr>
<td>31-40 years</td>
</tr>
<tr>
<td>41-50 years</td>
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<tr>
<td>51 years and above</td>
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<tr>
<th>2. GENDER:</th>
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<tbody>
<tr>
<td>male</td>
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</table>

| 3. QUALIFICATIONS          |
| a) ACADEMIC:               |
| Ordinary level             |   |
| Advanced level             |   |
| Other(specify)              |   |

98
b) **PROFESSIONAL:**

Diploma in education
Certificate in education
Degree

Degree and Teaching Qualification
Masters Degree
Doctorate and Above

Other (specify) ………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………

4) Length of teaching service

<1 year
1<x≤ 5
5<x≤8
8<x≤10
>20

**SECTION B: RESEARCH DATA**

1) Number of pupils with disabilities who wrote ordinary level mathematics for the past five years and the number of pupils who passed mathematics

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<td>Number of pupils who wrote</td>
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<td>Number of pupils who passed</td>
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</table>

2a) What can you say about the results?

………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
b) What can be the causes of the above results?
   
i.  

ii.  

iii.  

c) What can be done to improve the results?
   
   By the pupil
   
   By the teacher
   
   By the school
   
   By the Zimbabwe school examination council
3) Which teaching method do you use when teaching inclusive classes?
   i. ..............................................................................................................................
   ..............................................................................................................................
   ii. ...............................................................................................................................
   .................................................................................................................................
   iii. ...............................................................................................................................
   .................................................................................................................................
   iv. ...............................................................................................................................
4) Which topics do pupils with disabilities have difficulties in mathematics?

<table>
<thead>
<tr>
<th>Topic</th>
<th>Difficulties faced</th>
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<tbody>
<tr>
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<td>7.</td>
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</tbody>
</table>

5) What other difficulties do pupils with disabilities face in the learning of mathematics?

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6). How can these difficulties be reduced?

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7) How often do you give home work to pupils
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8) How do you accommodate pupils with disabilities in mathematic lessons?
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........................................................................................................................................
........................................................................................................................................
........................................................................................................................................

Thank you for your co-operation.
B. QUESTIONNAIRE FOR PUPILS

This questionnaire is designed for an educational research study into the causes of poor performance in mathematics by ordinary level pupils with disabilities at Danhiko Secondary School. The gathered will be treated with due confidentiality and used for the sole purpose of this research study.

INSTRUCTIONS
TICK THE APPROPRIATE BOX AND FILL IN THE BLANKS

NB: Please do not write your name on this questionnaire

SECTION A: DEMOGRAPHIC DATA
1. Age:  0-12 years  13-15 years  16-18 years  above 18 years

2. Gender:  male  female

3. In which form are you in 2013  Form 3  Form 4

4. Type of disability (specify)

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SECTION B: RESEARCH DATA

1) Marks obtained this year in mathematics tests as a percentage

<table>
<thead>
<tr>
<th>TEST</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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<tr>
<td>MARK</td>
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</tbody>
</table>
2) How do you rate your performance in mathematics?
   - Very poor
   - Poor
   - Average
   - Good
   - Very good

3) How do you view mathematics as a subject?
   - Very difficult
   - Difficult
   - Neutral
   - Easy
   - Very easy

4) Why do you view it that way?
   …………………………………………………………………………………………………………………………………………………………………………………
   …………………………………………………………………………………………………………………………………………………………………………………
   …………………………………………………………………………………………………………………………………………………………………………………
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5) a) What are the teaching methods used by your mathematics teacher
   …………………………………………………………………………………………………………………………………………………………………………………
   …………………………………………………………………………………………………………………………………………………………………………………
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b) Do the methods vary in each and every lesson?
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   …………………………………………………………………………………………………………………………………………………………………………………
6) How often are you given homework in mathematics?

………………………………………………………………………………………………………………
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7) Which topics do you find difficulties in mathematics?

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<thead>
<tr>
<th>Topic</th>
<th>Difficult faced</th>
<th>Reason</th>
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8) What can be done to reduce the difficulties you find in the topics you mentioned above?

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………………………………………………………………………………………………………………

Thank you for your co-operation
C. FOCUS GROUP DISCUSSION / INTERVIEW GUIDE FOR TEACHERS

Q1. Pupils with disabilities perform poorly in mathematics, what can be the possible causes of this poor performance?

Q2. What can be done by
   a) Mathematics teachers
   b) The pupils
   c) The school
   d) The ZIMSEC to improve the results?

Q3. Do the teaching methods, employed by mathematics teachers contribute to the difficulties faced by pupils with disabilities?

Q4. What is our attitude as mathematics teachers to pupils with disabilities?

Q5. Would our attitudes contribute to the difficulties faced by pupils with disabilities in the learning of mathematics?

Q6. What are the most difficulties faced by pupils with physical disabilities in the learning of mathematics?

Q7. How can these difficulties be minimized?
D. FOCUS GROUP DISCUSSION/INTERVIEW GUIDE FOR PUPILS

Q1. How do you rate your performance in mathematics?

Q2. How do you view mathematics as subject?

Q3. a) What are the teaching methods used by your mathematics teacher?

   b) Do they vary their teaching methods?

   c) Do you think the teaching methods can have anything to do with your difficulties?

Q4.a) Which topics do you find difficulties in mathematics?

   b) What can be done to reduce the difficulties?

Q6. What can be done to improve performance in mathematics?