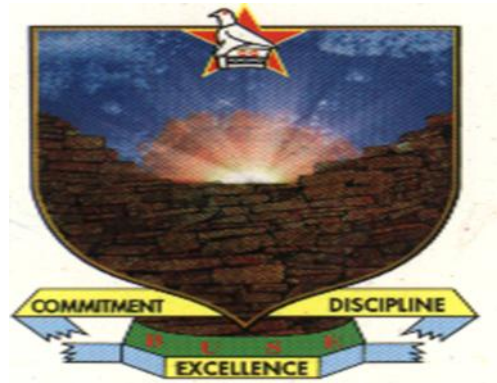


BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF SCIENCE EDUCATION

BACHELOR OF SCIENCE EDUCATION HONOURS

DEGREE IN MATHEMATICS



**EFFECTS OF INTERACTIVE TEACHING AND LEARNING METHODS IN THE
ACQUISITION OF BASIC MATHS CONCEPTS BY MILDLY MENTALLY RETARDED
LEARNERS. A CASE OF SECONDARY SCHOOLS IN CHIREDDI DISTRICT**

BY

MPANDAWANA JULIETH

REG NO. B225560B

**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS OF THE BACHELOR OF SCIENCE HONORS DEGREE IN
MATHEMATICS EDUCATION**

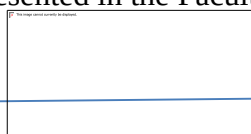
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DEDICATION

This research work is dedicated to my children Nigel, Desmond and Densel Mlambo.

ABBREVIATIONS/ACCRONYMS

FGD- Focus Group Discussion

HBSCED- Honours Bachelors Science Education Degree

HOD- Head Of Department

ABSTRACT

This study aimed to investigate the effects of interactive teaching and learning methods in the acquisition of basic maths concepts by mildly mentally retarded learners in secondary schools in Chiredzi District. The objectives guiding the study were to: explore the difficulties faced by mildly mentally retarded learners in learning Mathematics, identify the interactive teaching methods used in teaching mathematics, explore the perceptions of teachers on the use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners and investigate the impact of use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners. The study was guided by the interpretivist paradigm, following a qualitative research approach, and adopted the case study design. Purposive sampling was used to select information rich mathematics teachers and HODS from the district. The study used semi-structured interviews and focus group discussions to collect the data from the participants. The findings, of the study show that mildly mentally retarded learners face challenges in understanding abstract mathematical concepts, have fear and anxiety due to labelling from other learners, teachers use activities with manipulative materials and maths games when teaching maths to mildly mentally retarded learners, interactive methodologies are effective in improving understanding and retention of basic maths concepts, enhance learner autonomy, maths exploration and self-directed learning leading and the use of interactive methods result in improved understanding and retention of maths concepts, develop hands on experiences and practical application of mathematics. The study recommends that the ministry should ensure that teachers are professionally trained to handle mentally retarded learners, schools should have separate classes for mildly mentally retarded learners to reduce fear and anxiety, teachers should use interactive methods and activities with manipulative materials, geometry shapes as scaffolding and the ministry schools should enact enabling policies to foster the use of technology in order to motivate and increase engagement for mildly mentally retarded learners.

Table of Contents

RELEASE FORM.....	ii
DECLARATION.....	iii
APPROVAL FORM.....	iv
ACKNOWLEDGEMENTS.....	v
DEDICATION.....	vi
ABBREVIATIONS/ACCRONYMS.....	vii
ABSTRACT.....	viii
LIST OF TABLES.....	xii
LIST OF APPENDICES.....	xiii
CHAPTER I.....	1
1.1 Introduction.....	1
1.2 Background to the study and its setting.	1
1.3 Statement of the problem.....	3
1.4 Purpose of the study.....	3
1.5 Main research question.....	4
1.6 Sub research question.....	4
1.7 Objectives of the study.....	4
1.8 Significance of the study.....	4
1.9 Delimitation of the study.....	5
1.10 Limitations of the study.....	5
1.11 Definition of key terms.....	5
1.12 Organisation of the study.....	6
1.13 Summary.....	6
CHAPTER II: LITERATURE REVIEW.....	8
2.1 Introduction.....	8
2.2 Theoretical framework.....	8
2.3 The challenges faced by mildly mentally retarded learners in learning Mathematics.....	8
2.4 The interactive teaching methods used in teaching mathematics to mildly mentally retarded learners.....	10
2.4.1 Using play, games and visual representations.....	10
2.4.2 Technology-enhanced learning.....	11
2.4.3 Use of music.....	11
2.4.4 Using math GASING.....	12

2.5 The perceptions of teachers on the use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners on acquisition of basic maths concepts and learning outcomes.	12
2.6 The impact of use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners on acquisition of basic maths concepts and learning outcomes.	14
2.7 Summary	15
CHAPTER III: RESEARCH METHODOLOGY	15
3.1 Introduction.....	15
3.2 Research Paradigm.....	16
3.3 Research approach	16
3.4 Research design	16
3.5 Research population.....	17
3.6 Sample and sampling technique.....	17
3.6.1 Purposive sampling.....	17
3.7 Research Instruments	17
3.7.1 Interview	18
3.7.1.1 Advantages of interviews.....	18
3.7.1.2 Disadvantages of interviews	18
3.7.2 Focus group.....	19
3.7.2.1 Advantages of focus group discussion.....	19
3.7.2.2 Disadvantages of focus group discussion	19
3.8 Credibility and trustworthiness	20
3.9 Ethical Considerations	20
3.10 Summary	20
CHAPTER IV: DATA PRESENTATION, ANALYSIS AND DISCUSSION	21
4.1 Introduction.....	21
4.2 Demographic information of the participants	21
4.3 The challenges faced by mildly mentally retarded learners in learning Mathematics in Chiredzi district.	23
4.4 Interactive teaching methods used in teaching mathematics to mildly mentally retarded learners, in Chiredzi district.....	24
4.5 Perceptions of teachers on the use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners.	25
4.6 The impact of the use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners.....	26
4.7 Discussion	27

4.8 Summary	29
CHAPTER V: CONCLUSIONS, SUMMARY AND RECCOMENDATIONS	30
5.1 Introduction.....	30
5.2 Summary of the Study	30
5.3 Conclusions.....	32
5.4 Recommendations.....	33
References	34
Appendix A: BUSE research letter.....	42
Appendix B: Letter to Mope requesting permission to carry out the research	43
Appendix C: Interview guide for maths HOD's.....	45
Appendix D: Focus group discussion guide for maths teachers	46

LIST OF TABLES

Table 4.1: Distribution of HODs by gender, experience and qualification.....22

Table 4.2: Distribution of teachers by sex, experience and qualification23

LIST OF APPENDICES

<u>Appendix A: BUSE research letter</u>	Error! Bookmark not defined.
<u>Appendix B: Letter to Mope requesting permission to carry out the research</u>	Error! Bookmark not defined.
<u>Appendix C: Interview guide for maths HOD's</u>	Error! Bookmark not defined.
<u>Appendix D: Focus group discussion guide for maths teachers</u>	Error! Bookmark not defined.

CHAPTER I

1.1 Introduction

Individuals who are mildly mentally retarded have difficulties in calculating necessary mathematical abilities even when doing transactions. Thus, the effect of mathematics learning difficulties on mildly mentally retarded learners is seen from their difficulties in carrying out daily activities such as time management, measuring and generally using money. Thus education systems must aim at finding ways to ensure that all learners including the mildly mentally retarded are well prepared and equipped to solve life problems without much difficulties. This chapter focuses on background to the study, the research objectives and significance of the study, the boundaries of the study and organization of the study and definition of terms amongst other essential elements.

1.2 Background to the study and its setting.

Mathematics plays a pivotal role in solving problems in life and is a fundamental ability that every human being should master (İlhan, 2008). Mathematics can also be viewed as universal knowledge that provides benefits for human life and a foundation in the development of the modern world technology. As such everyone including children with special needs should master this ability in solving various life problems that require reasoning and logic. However, Goransson, Hellblom-Thibblin and Axdorph (2016) on the other hand state that children with special needs experience problems in mastering and developing mathematical abilities on their own. The authors went on to emphasise that education of students with disabilities has undergone several shifts in the past few decades. For example, the authors state that in the 1970's there was a policy of "normalisation" and the education of students with disabilities focused on training basic skills in self-care, socialisation, and recreation. Dessemontet, Bless and Morin (2012) argue in recent times, inclusion has become "a global agenda" and education policies have been increasingly changing towards this model in many countries. Ferguson (2008) put forward that there are a lot of varieties in the way that inclusive education is implemented across different nations. Ferguson's study determines that while some countries have developed broad inclusive practices, others still educate individuals with ID in special classes or special schools.

Eripek and Vuran (2010) state that the primary objective of teaching both fast learners and mentally retarded learners is to teach and incorporate skills that enable them to live without

being dependent on others by being self-sufficient and integrating with the society at all points. Erata (2010) argues that mentally retarded learners constitute a vast majority among the children with special needs and the learners are not homogeneous. Aral and Gursay (2012) emphasises that mentally retarded learners can be divided into four groups depending on their level of need for special education which are mild mental retardation, moderate mental retardation), severe mental retardation and profound retardation. Texas Health and Human Services, (2020) revealed that students with mild intellectual disability are educable and could be place in inclusive setting due to they can learn most of what the average students learn, but in a slower rate. Thus it is important to use appropriate educational materials in teaching meta-cognitive knowledge which includes understanding and controlling their cognitive processes in mentally retarded learners.

According to Schoenfeld (2014) since the middle of the 20th century, there have been significant on-going shifts in the structure, content, and core principles of mathematics curricula in countries around the world. Recent changes such as the widespread adoption of the Common Core State Standards in Mathematics in the U.S. and Project Maths in Ireland, both in 2010, indicate that there is return to a focus on problem solving and placing mathematics in context so that students can make sense of what they are learning (Schoenfeld, 2014). Griffin et al. (2013) emphasises that this shift in perspective requires a different style of teaching, in which students' participation in the learning process. Large scale national achievement testing in the U.S. indicates that the majority of students with disabilities do not reach grade level proficiency in mathematics (U.S. Department of Education, 2009). For students with intellectual difficult (ID), this situation becomes even more worrying since they may have limitations that lead to difficulties with the learning of certain mathematical concepts. Despite these typical features, in some research studies students with ID have succeeded in challenging areas of mathematics such as making sound mathematical decisions to solve word problems and creating their own strategies for solving arithmetic problems (Hord & Xin, 2015). A study carried out by Westwood (2011) evidenced that if students with ID are engaged, and their educational needs are supported through the use of effective resources, then they can experience success in their academic endeavours.

Saeidinia (2016) states that in educational systems, the implementation of the curriculum must not be discriminatory but should be fair by upholding human rights, religious and cultural values, and national pluralism. Thus, it appears that all elements of society in the world have the right to obtain education, including children with special needs or often called special

children. Kraemer and Blacher (2020) put forward that one of the realizations of education programs as the right of every citizen in a country like Indonesia is by establishing formal educational institutions ranging from elementary to high school for ordinary education and special/special education. The authors went on to establish that the lessons given in public schools must be the same as those given in special schools.

Many African countries are adopting the concept of inclusive education as a result of international conventions and pressure from disability advocacy groups, mainly from international communities such as the United States of America and the United Kingdom (Chimhonyo, Kaputa, Mamvura, Hlatwayo, Munemo, Nyatsanza, & Mutandwa, 2011). Mpofu and Shumba (2012) state that the participation of learners with mental retardation in Zimbabwe inclusive education system has improved due to the involvement of learners with mental retardation disabilities in various inclusive education activities. This has directly influenced most Zimbabwean learners with mental retardation to move from disability group homes to learning in more inclusive education setting (Hansen, 2012). As such research should now focus on the instructional strategies that be used to ensure that the mildly retarded learners are also catered for. The study sought to explore the effects of interactive teaching and learning methods in the acquisition of basic maths concepts by mildly mentally retarded learners in Chiredzi District secondary schools.

1.3 Statement of the problem

In the modern world there is a growing concern about the effectiveness of traditional lecture-based teaching methods in promoting optimal student learning outcomes. Many countries still rely heavily on traditional teacher centred approaches, where learners passively learn without active engagement in the learning process. This traditional approach may not be fully conducive to the diverse learning needs and preferences of learners. There is a need to explore and understand the impact of interactive teaching methods on learners learning outcomes in the context of mildly mentally retarded learners. Furthermore, research on the impact of interactive teaching methods on mildly mentally retarded learners learning outcomes is relatively limited, and there is a need for updated and localized evidence in the Chiredzi District context.

1.4 Purpose of the study

The study sought to establish the effects of interactive teaching and learning methods in the acquisition of basic maths concepts by mildly mentally retarded learners in Chiredzi District.

1.5 Main research question

How do interactive teaching and learning methods influence the acquisition of basic maths concepts by mildly mentally retarded learners?

1.6 Sub research question

The study aimed at answering the following questions:

- What are the difficulties faced by mildly mentally retarded learners in learning Mathematics?
- Which interactive teaching methods are used in teaching mathematics to mildly mentally retarded learners?
- How do teachers perceive the use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners on acquisition of basic maths concepts and learning outcomes?
- How does the use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners influence the acquisition of basic maths concepts and learning outcomes?

1.7 Objectives of the study

The objectives of the study were:

- To explore the difficulties faced by mildly mentally retarded learners in learning Mathematics
- To identify the interactive teaching methods used in teaching mathematics to mildly mentally retarded learners
- To explore the perceptions of teachers on the use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners on acquisition of basic maths concepts and learning outcomes
- To investigate the impact of use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners on acquisition of basic maths concepts and learning outcomes

1.8 Significance of the study

The study provided valuable information that can guide policymakers, educators, and administrators in Chiredzi District and Zimbabwe as a whole in making informed decisions about instructional practices to improve student learning outcomes. This can provide evidence

on the teaching methods that are effective in promoting optimal student learning outcomes in mildly mentally retarded learners in mathematics. The study may also provide updated and localized evidence on this topic in Chiredzi context, specifically in the teaching and learning of mathematics.

The responsible ministry and schools may realise the need to train more personnel to handle learners with intellectual challenges and create awareness campaigns to parents and guidance of mildly mentally retarded children on how they can best support the learning of their children. The ministry through the district can also be able to monitor, support schools and offer all the necessary support in material and human resources to ensure that the mildly mentally retarded learners are attended to in schools. The teachers will gain more knowledge and skills in handling mentally retarded learners and develop a positive attitude towards the learners and support them. The learners in the schools will be able to appreciate and accommodate mentally retarded learners and learn with them.

1.9 Delimitation of the study

The research was confined to ‘O’ level mathematics learners and teachers from three Chiredzi District secondary schools. The study only focused on the effects of interactive teaching and learning methods in the acquisition of basic maths concepts by mildly mentally retarded learners.

1.10 Limitations of the study

The limitations of the study include expenses to contact all the participants from different schools, printing the research instruments. The researcher used WhatsApp to communicate with some of the respondents and arrange for the interview sessions. The distance between the researcher and her supervisor was a challenge and the fact that the researcher had to mainly communicate with the supervisor online made the researchers life hard. Network challenges were faced which delayed the project. The researcher could not physically have access to the libraries hence had to rely more on online resources in order to get literature related to the researcher’s topic.

1.11 Definition of key terms

Inclusive education- According to Kochung (2011) inclusive education is an education system that responds positively to diversity and sees individual differences not as a problem but as an opportunity for enriching itself.

Information and Communication Technology -Mdlongwa (2012) defines Information and Communication Technology (ICT) as a “global network in which ideas are exchanged, or information and knowledge is shared, through using communication technology like cell phones, and technology like computers, to connect people.

Interactive teaching methods- refer to instructional techniques that actively engage students in the learning process, encouraging their participation, collaboration, and critical thinking (Afzal& Rafiq, 2022). These methods go beyond passive listening to lectures and involve students in active learning activities, such as discussions, group work, simulations, case studies, role plays, and problem-solving exercises.

Mental retardation- According to Heward (2009) mental retardation is a deficiency occurring during the development process and is characterized by significant limitations in the ability to adapt to the environment accompanied by distortion in various dimensions of intelligence such as cognitive, language, motor and social-emotional skills.

1.12 Organisation of the study

The study was organised in five chapters. Chapter one contained the introduction, global, regional and national background of the study, statement of the problem, objectives of the study, main research questions, sub research questions, significance of the study, delimitations of the study, limitations of the study and organisation of the study. Key terms used in the study were defined at the end of chapter one. Chapter two covered the literature review derived from local, regional and international studies on the effects of interactive teaching and learning methods in the acquisition of basic maths concepts by mildly mentally retarded learners. Chapter three presented the research methodology used in the study. It covers the research paradigm, research approach, research design, population, sampling technique and the sample, research instruments, validity and reliability, data collection procedures and method of data analysis. Chapter four covered data presentation, analysis, and discuss the research findings from the different participants from the three schools selected in the study. The data was presented thematically using themes generated from the responses given by the participants. Chapter five presented the summary of findings, gives recommendations based on the main research findings and give the summary of the study.

1.13 Summary

This chapter introduced the study by giving the background of the study, statement of the problem, research questions, objectives, importance, assumptions, and statement of the

problem, delimitations and the limitations of the study. The following chapter focuses on review of literature related to the study.

CHAPTER II: LITERATURE REVIEW

2.1 Introduction

This chapter presented the theoretical framework and the international, regional and national literature guiding the study. The literature was reviewed in line with the research objectives. The first subheading under literature review is the difficulties faced by mildly mentally retarded learners in learning Mathematics and the second subheading is interactive teaching methods used in teaching mathematics to mildly mentally retarded learners. The literature also reviewed the perceptions of teachers on the use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners on acquisition of basic maths concepts. Lastly, the impact of use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners on acquisition of basic maths concepts and learning outcomes was discussed.

2.2 Theoretical framework

The theoretical framework guiding the study is the social constructivism theory of learning. Bates (2019) puts forward that Vygotsky's social constructivism theory of learning explains that learning occurs during social interactions between individuals and according to the theory learning happens first through social interaction and second through individual internalization of social behaviours. In the social constructivism theory, students and teachers form relationships in the classroom to help the student learn. The relationships help facilitate social interaction and active participation in the learning tasks. Students learn through observation, listening and talking through their tasks. Through social constructivism theory, knowledge and interactions are constructed through social interactions with family, friends, teachers and peers. In Vygotskian theory, the importance of guidance does not really imply that growth is a method of transfer from the perspective of the students, but rather that guidance takes various forms of conciliation, such as consciousness and assistance, to enable students to take responsibility for their learning (Shabani & Ewing, 2016). Learning, in particular the learning of mathematics is considered as a social construction by social constructivists. Thus, basing on social constructivism theory, interactive teaching and learning methods influence the acquisition of basic maths concepts by mildly mentally retarded learners.

2.3 The challenges faced by mildly mentally retarded learners in learning Mathematics

According to Hord and Xin (2015) students with mental retardation are likely to experience challenges with problem solving and abstract reasoning such as drawing conclusions, making generalisations and representing concepts symbolically which are fundamental to the learning

of mathematics. Additionally, De Oliveira Malaquias, , Lamounier and Cardoso (2013) state that learners with mild mental retardation may also have difficulty with spatial relationships, distances, and sequencing which can interfere with the acquisition of mathematics concepts and skills, such as estimating size and distance and problem solving. Also, they often struggle with remembering information that was presented which leads to confusion with the abstract symbols used in mathematics such as minus, greater than, less than signs. Kumatongo (2019) puts forward that difficulties with time and understanding money value and shopping are also common in mildly mentally retarded learners. Time is a functional skill, learners with ID face difficulties with topics relating to time; telling time, keeping track of time, estimating time, monetary concepts, and counting money.

Some students with mental retardation struggle with motivation to learn mathematics and often require the mediation of the teacher to get involved with activities (De Oliveira et al., 2013). This is especially true of more difficult and abstract activities in the subject that do not have an immediate and clear social function. For learners with mental retardation the ability to think is limited, low memory, and the difficulty of abstract thinking of the students is the reason students have difficulties in academic fields such as number division skills (Critten, Campbell, Farran & Messer, 2018). Furthermore students with mental retardation are not able to count, recognize numbers and letters, spelling out the letters, and perform mathematical operations, such as sum and subtraction (Parmi & Irwandi, 2020). The students with mental disability often experience difficulties due to their confusion with the symbols; +, -, x and % in mathematics.

According to Karagiannakis, Baccaglini-Frank and Papadatos (2014) the other form of mathematics difficulties is concerned with poor learning methods or strategies. Such learners have underdeveloped strategies for learning new material and they experience challenges in solving problems. This manifests in how they plan their work; thus, they often face challenges and appear disorganized in planning how to solve and complete tasks in mathematics. Although they may know algorithms, they may not fully understand how to apply them. They can also calculate but this takes a long time for them to do so. Mcheka (2009) emphasises that another category is made up of learners with insufficient understanding of mathematics concepts. Learners who fall in this category need support to understand the mathematical problem or how the problem is related to different mathematical operations such as subtraction and addition. Thus, they struggle in dealing with texts that involve several calculation operations. They have a significantly reduced abstraction level, meaning they can only manage concrete tasks. This often applies to a group of pupils whose ability level is low. Lastly there is a group with poor

automatization (Karagiannakis, Baccaglini-Frank & Papadatos, 2014). Learners in this category of difficulties in Mathematics cannot memorize such tables as multiplication and addition tables and must therefore calculate everything from the start every time and do not learn from the mistakes they make for improvements. This often applies to learners with low reading skills, poor memory, poor understanding of numbers/numeracy and those without task accuracy.

2.4 The interactive teaching methods used in teaching mathematics to mildly mentally retarded learners

2.4.1 Using play, games and visual representations

Mentally retarded children are likely to show inadequacy at using methods necessary for arranging their cognitive processes effectively on their own. Hence when teaching mentally retarded children, it is important to use appropriate educational materials in teaching meta-cognitive knowledge which includes understanding and controlling their cognitive processes. Learning can effectively take place through play, because play is interactive and motivates. Munsaka and Kalinde (2017) put forward that games can promote hand-eye coordination, turn-taking, ability to combine objects and spatial skills which are critical in the learning of mathematics. Educational games are a resource that can be used as an alternative to textbooks and other traditional resources and can promote inclusion, regardless of students' differences (De Oliveira et al., 2013). Puzzles, which have a crucial role in transmitting cognitive knowledge, can also be used for enriching the learning process and embodying the knowledge.

In addition, Gunter, Kenny and Vick (2018) put forward that puzzles are effective instructional materials in that they support children's developmental areas (cognitive, language, motor, social and emotional development), interests and needs, by providing an entertaining learning environment (Sull, 2016). Nekang (2016) identified examples of mathematical games such as Dice or ludo game and coin game for probability. Also other games identified are Geoboard games for geometric concepts, for angles, identifying and differentiating polygons, describing and locating coordinate points; coordinate game for Cartesian plane and coordinates. Lastly, Card game for elementary number concepts, arithmetic processes especially addition, simplifying algebraic expressions, ordering fractions, geometric concepts, probability and randomness and so on was identified. Students play these games, they recognize the concepts and objects and learn their features and functions. Such learning promotes the accumulation of knowledge in mind. Throughout this process, students think, perceive, understand and

symbolize. These cognitive processes carried out during the play also promote the related cognitive skills.

Visual representations are likely to help students with general disabilities (Jansen, De Lange & Van der Molen, 2013). For example the use of manipulatives, either concrete or visualised, are useful aids for students to solve mathematics problems. They are especially useful for solving addition and subtraction problems. Kuswardhana, Hasegawa and Juhanaini (2017) state that the use of assistive devices and technology can help mentally retarded students overcome difficulties in measuring and increase student motivation.

2.4.2 Technology-enhanced learning

Burton, Darlene, Anderson, Prater and Dyches (2013) state that the advancement of technology has made a significant impact on the evolvement of teaching methods from traditional face-to-face teaching to Computer-Based Learning (CBL) or- e-learning systems in all levels of education. Modern education and communication environments can offer alternative ways in the learning process. Kurvinen (2020) puts forward that Technology-enhanced learning (TEL) is one of the key tools that enriches educational productivity by integrating technological media into education and also develops a lifelong love of learning in students. TEL provides educators with different means of learning, and they are no longer limited to institutionally provided textbooks. Moreover, TEL tools aim to achieve greater diversity and flexibility in the teaching and learning environment and promote student centred learning. Ahmadi (2018) emphasises that technology can also increase opportunities for students with mental retardation to access the core curriculum and achieve improved learning outcomes. Thus technology enhanced learning can provide interactive ways to teach mathematics to mildly mentally retarded learners.

2.4.3 Use of music

In the view of Robertson and Lesser (2013) music, an essential category of the arts, has been developed with different curriculum elements and instructional strategies to supplement other school subjects, especially mathematics. The natural similarities between music and mathematics includes patterns, structures, and symbols offer rich overlapping knowledge areas for mathematics lessons to be integrated with various music concepts. By designing appropriate music integrated mathematics lessons, students can understand, analyze, and interpret mathematics through different routes (Brown; 2013). For example, Tillman (2013) highlights that elementary school teachers have utilized advanced digital manufacturing

technologies, including 3D-printers, to involve students in music instrument design and fabrication activities based on mathematical concepts such as measurement and geometry. However, existing research on teaching mathematics through music is usually focused on the superficial relationship between mathematics and music. As such An, Capraro and Tillman (2013) emphasises that more research needs to be done on how teachers develop their abilities to teach mathematics concepts through contextualized music activities.

2.4.4 Using math GASING

Learning material for abstract mathematical concepts makes students feel difficult if not done correctly (Multu & Akgun, 2018). Professor Yohanes Surya made GASING method which is an approach used to make a learning design for whole number addition. According to Nuari, Prahmanav and Fatmawati (2019) GASING is an abbreviation of easy (GAmpang), fun (ASyIk), and enjoyable (menyenaNGkan). A researcher makes learning design division operations using Math GASING by converting something concrete towards an abstract thing (Prahmana&Suwasti, 2014). Math GASING can be used as an intermediary in teaching the concept of division to students. Nurfathoanah (2017) states that math GASING can be applied to help understand students about addition operations. Math GASING is the right method to make it easier for students to learn mathematics in the division operation. The Math GASING shows students about the process of converting concrete things into abstracts and drawing conclusions made by the students themselves.

2.5 The perceptions of teachers on the use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners on acquisition of basic maths concepts and learning outcomes.

According to Alabdulaziz and Higgins (2017) teachers are the chief implementers, real practitioners and fully experienced of educational programs of catering the needs of intellectually disabled students. In inclusive setup schools teachers try their best to do their jobs although the perceptions of teachers may affect the learning performances, outcomes of intellectually disabled students. Algahtani (2017) carried out a study and found that despite the fact that teachers are willing to make necessary accommodations for students with disabilities, the majority of the teachers feel that students with disabilities should not be educated in general classrooms no matter what the simplicity or severity of the disability, especially students with behavioural disorders and/or mental retardation.

The majority of the teachers have a positive attitude toward inclusion which can only be successful with enough training and administrative support. Regular school teachers feel that they have nothing much to offer students with mental disabilities in inclusion setting as compared to specialist teachers. Bacon and Baglieri (2021) established that some teachers have the conviction that special schools have more to offer and that they can relieve students from the stress of continuous performance pressure of failure and under achievement in regular schools. As such these teachers have negative unsupportive attitudes towards inclusion. They do not even see the value of interactive teaching methods to mildly mentally retarded learners in mathematics. The majority of teachers feel they have got a difficult enough job without having to think about learners with mental disabilities who are viewed as an extra burden. These teachers are not comfortable with the large numbers, poor working conditions and remuneration; hence their resistance against the inclusion of learners with mental disabilities in ordinary classes (Alabdulaziz & Higgins, 2017). The same arguments are provided by teachers that they cannot promote inclusion while they experience conflicting constraints and expectations, insecurity and a general lack of encouragement.

Teachers believe that learning mathematics for mentally retarded students is important. Furlong, McLoughlin, McGilloway, Geary, and Butterworth (2016), suggest that mildly mentally retarded learners should learn mathematics to acquire basic numeracy skills and ability to navigate everyday life. In addition, by studying mathematics, students with intellectual disabilities have a greater chance to successfully navigate life in the future when compared to not studying mathematics. One of the most basic mathematical skills that need to be given to mentally retarded students is the ability to recognize numbers (Anggraini&Wahyuno, 2013). The introduction of numbers is first given to mentally retarded students before being given the concept of operations on numbers, this aims to provide them with a mathematical foundation or basis. Taufiq, Prihatiningsih and Widodo (2021) put forward that by providing a strong mathematical foundation or prefix, the ability of mentally retarded children can be ensured to be better and it becomes easier to learn further mathematical material such as the concept of counting operations on numbers. Pradani, Lestari and Wibowo (2015) put forward that teachers in Indonesia, use snake and ladder media to improve students' numeracy skills or use stick numbers to introduce numbers to mentally retarded students. This suggests that the choice of media must be adjusted to the characteristics of students such as the condition of students with mental retardation or mental retardation

2.6 The impact of use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners on acquisition of basic maths concepts and learning outcomes.

Jamil and Bhuju (2023) put forward that with changing pedagogical perspectives and the integration of technology, interactive teaching methods are gaining recognition for their potential to enhance student engagement and improve learning outcomes. A study by Maheshwari, Saxena and Sharma (2020) in India examined the impact of flipped classrooms on student learning outcomes in a mathematics course. The findings revealed that students who experienced flipped classrooms had significantly higher academic achievement and better problem-solving skills compared to those who received traditional lecture-based instruction. This study suggests that flipped classrooms can promote active learning, critical thinking, and problem-solving skills among students.

While children play games they gain social skills such as waiting for their turn, sharing and cooperating as well as some improvements observed in fine and gross motor skills (Gunter, Kenny & Vick, 2018). Additionally, Aral, Gürsoy and Can (2012) found out that puzzles and other games had been effective in supporting the cognitive, language, motor, social and emotional developmental areas of children showing normal developmental characteristics. In this context, interactive approaches can be considered as an effective tool in the education of mentally retarded children.

Rutherford (2015) opined that people of all ages love to play amusing and inspiring games that may arouse their interest to learn and discover new ways of doing things. Mathematical games help students to explore elementary number concepts such as the counting sequence and series, number and numeration, basic number operation, one-to-one correspondence, and computation strategies. Engaging mathematical games can also encourage students to explore number combinations, place value, patterns, arithmetic processes and other important mathematical concepts. Also, mathematical games help students to deepen their mathematical understanding, reasoning, and applications such in sets and logic, measurement, geometry, trigonometry, graph, probability and statistics. Nekang (2016) states that when played repeatedly, games support students' development of computational fluency. Games support a school to home connection, thus parents can learn about their children's mathematical thinking by playing games with them at home. The kind of concentration and skill needed often lead to discovery and creativity, for example, geometrical shapes.

2.7 Summary

This chapter discussed the literature which revealed that mildly mentally retarded learners have challenges in problem solving and abstract reasoning in mathematics. Also the chapter reviewed that games and technology enhanced learning can be used as interactive ways to teach mathematics to mildly mentally retarded learners and teachers have a negative attitude towards the teaching of mildly mentally retarded learners in inclusive classes. Lastly, the chapter reviewed that interactive methodologies increase interest and understanding of mathematics concepts by mildly mentally retarded learners.

CHAPTER III: RESEARCH METHODOLOGY

3.1 Introduction

This chapter explored the research paradigm, research approach, research design, population and sample of the study, research instruments, data analysis techniques, credibility and trustworthiness and ethical considerations guiding the study. The study was qualitative in nature hence the interpretivist approach and case study research design were adopted for the study.

3.2 Research Paradigm

A research paradigm is a philosophical way of thinking that guides the study (Mack, 2010). The research adopted the interpretivist paradigm. Hammersley (2013) puts forward that with interpretivism perspective, researchers tend to gain a deeper understanding of the phenomenon and its complexity in its unique context instead of trying to generalise the base of understanding for the whole population. According to Mack (2010) the central endeavour of the interpretivist paradigm is to understand the subjective world of human experience by adapting a relativist ontology which emphasises that a single phenomenon can have multiple interpretations rather than a single interpretation. Additionally, Hawking and Mlodinow (2010) argue that when people interact with their surroundings, there is no such thing as an objective reality because reality is constructed by an individual on the basis of observation and personal interpretation of events. The researcher opted for the interpretivist paradigm because it allowed the researcher to gain a deeper understanding on the effects of interactive teaching and learning methods in the acquisition of basic maths concepts by mildly mentally retarded learners.

3.3 Research approach

The research followed a qualitative research approach which complements the interpretive paradigm through a detailed and comprehensive research approach. Bhandari (2022) states that for the study of human phenomena, qualitative researchers employ a variety of systems of inquiry, such as biography, case study, historical analysis, discourse analysis, ethnography, grounded theory, and phenomenology, as opposed to logical and statistical methods. Qualitative research approach involves the gathering and analyzing of non-numerical data in order for the researcher to better understand experiences, ideas and opinions of the participants. This is essential in research as it can be used to uncover intricate details about a phenomenon. The main focus of the researcher was to explore the effects of interactive teaching and learning methods in the acquisition of basic maths concepts by mildly mentally retarded learners.

3.4 Research design

A detailed research design is needed to ensure that the objectives of the study are met. According to Ahuja (2010) research design is a blue print guiding a study and it is essentially the glue that holds the different elements of the research together. Furthermore Kothari (2010) asserts that a research design is a structure, plan and strategy conceived in order to ensure that all the variables are controlled. The elements that need to be glued together include the data collection procedures, processing and analysis of the data and most importantly it forms a logical basis for the decision making. For this study, the researcher adopted a case study design

to investigate the effects of interactive teaching and learning methods in the acquisition of basic maths concepts by mildly mentally retarded learners in secondary schools in Chiredzi District. The researcher collected data using interviews and focus group discussions from mathematics HOD's and maths teachers from three selected secondary schools from Chiredzi District.

3.5 Research population

Population is a group of people with similar characteristics to which the results of the study will be generalised to (Shukla, 2016). According to Shukla (2020) population refers to the set or group of all the units on which the findings of the research are to be applied. A population is the entire group of people who share similar experiences. For this study the population was made up of all the mathematics HOD's and maths teachers in Chiredzi District.

3.6 Sample and sampling technique

According to Shukla (2020) a sample is a part of a population of research which represents all the types of elements of the population. A sample is a portion taken from the population which is used for data collection representing the whole sample. A sample is simply a sub set of the whole population. For this study the sample was made up three HODs and six maths teachers from the three selected secondary Schools from Chiredzi District.

3.6.1 Purposive sampling

Sampling refers to the process of selecting a portion of the population that conforms to a designated set of specifications to be studied. The researcher used purposive sampling technique in this study. According to Flick (2006), purposive sampling requires selecting participants who are knowledgeable about the issue in question, because of their sheer involvement in and experience of the situation. While Creswell (2013) states that purposive sampling refers to selection of sites or participants that will best help the researcher understand the problem and the research question, they must be willing to reflect on and share this knowledge. In this study purposive sampling was used because the researcher wanted to select information rich mathematics teachers and HODS. The researcher selected teachers from schools that are closer to each other so that the focus group discussion will be made of teachers closer to each other.

3.7 Research Instruments

A research instrument is a tool that is used to collect data from the participants. The researcher utilised interviews and focus group discussions as the data collection instruments.

3.7.1 Interview

Cohen, Manion and Morrison (2018) put forward that an in-depth interview is one of many qualitative research techniques used to gather data on the subjective experience of participants. The purpose is to get detailed information that sheds light on an individual's perspective and the perceived meaning about a particular topic, issue or process. Interviewing as a research methodology has a long history in the social sciences, dating back to the 1880s when it was used to study poverty in London (Morris, 2015). An in-depth interview resembles a conversation but is designed to stimulate depth of meaning from the perspective of the participant. The researcher used semi structured interviews to collect data from the HODs used in the study. A semi structured interview was used because it is made up of a list of questions which are written down and used by the researcher during data collection but the researcher has the freedom to change the wording or the order of the questions.

3.7.1.1 Advantages of interviews

Traditionally, in-depth interviews are conducted one-on-one which allows the researcher to focus on the interviewee's answers while paying close attention to accompanying signals such as emotion and body language (Morris, 2015). Furthermore, in-depth interviewing relies heavily on open-ended questions and the researchers may start with structured outline informed by research goals but can change the order of the questions. According to Anastassiou (2017) the researcher interacts with the interviewee using techniques such as inductive probing, following up on remarks and asking for explanations to add depth to and clarification of the interviewee's perspective. This makes the interview look and feel like a conversation, relieving pressure and increasing empathy and trust that facilitate the discussion of feelings and emotions. This is particularly useful when investigating sensitive topics where qualitative investigations provide valuable context and insight that quantitative studies cannot and where the nuances of motivation and impact are difficult to quantify. Kumar (2011) states that an interview allows the researcher to even discover new knowledge or even research in new areas he /she did not intend to research on. Thus interviews allow researchers to find the knowledge gaps and new areas of research as it allows cross-questioning.

3.7.1.2 Disadvantages of interviews

One of the primary weaknesses of in-depth interviewing is small sample size. While necessary for feasibility, this precludes selecting a random sample and generalizability. Creswell (2015) states that the data gathered interview is susceptible to researcher bias and the participants may just say things meant to make the researcher happy but biased. Additionally, interviews are

costly in time, for researchers and participants. Some participants may not be willing to divulge some information in the presence of the researcher as they may feel that the researcher will not adhere to research ethics such as anonymity and confidentiality (Anastassiou, 2017). This results in participants withholding some important information.

3.7.2 Focus group

The researcher used focus group discussion to collect data from the sample of mathematics teachers from Chiredzi district. FGDs are an extended way of the interview method, a more specific in-depth group interview with discussion (Manju, 2020). USAID (2011) asserts a focus group discussion (FGD) is an in-depth field method of data collection that brings together a small homogeneous group of six to twelve participants to discuss topics on a study agenda. The researcher can remain in control of the data collection process and motivate or stimulate participants to reveal attitudes, opinions and reasons for their behaviour. Thus FGD are of paramount importance in finding out the ‘how’ and ‘why’ of human behaviour.

3.7.2.1 Advantages of focus group discussion

There are clear benefits associated with FGDs. For example, they are participatory methodologies that can fully engage different stakeholders in collecting and analysing information (Yin, 2018). Focus group interactions can enrich the quality and quantity of information generated and in some cases the discussions can reveal ideas or solutions for particular challenges and problems. And, in general, FGDs can generate insights more quickly and cheaply than key informant interviews or surveys. The researcher used focus group discussions for this study because of their richness and flexibility. Creswell & Poth (2018) asserts that focus group discussions can encourage participation from participants who are usually reluctant to be interviewed individually and also the costs are reduced because the researcher is able to meet with a large number of participants at once.

3.7.2.2 Disadvantages of focus group discussion

Despite having numerous strengths every method has its own weaknesses, Yin (2018) states that when focus groups are used there is the possibility of manipulation of participants or bias through dominating participants and sometimes there are difficulties in distinguishing between an individual view and a group view. Additionally, the analysis of data collected through focus group discussions is difficult and tiresome. It can be also harder to get everyone in the same place at the same time, hence making the data collection process tiresome and difficult.

3.8 Credibility and trustworthiness

A qualitative researcher's tool chest should be geared towards trustworthiness and encompass issues such as credibility, dependability, transferability and conformability. In order to ensure credibility (Lincoln, 2015), states that the researcher should be concerned with activities that increase the probability that credible responses will be produced. This can be done through triangulation of data sources. In this study the researcher collected data from mathematics teachers and head of departments. The researcher used a variety of data collecting instruments in the form of the semi structured interview guide and focus group discussion guide.

3.9 Ethical Considerations

The researcher adhered to ethical consideration while carrying out this study and respected the rights of the research participants that include voluntary participation, anonymity and confidentiality (Filippa 2011). The researcher requested for permission to carry out the research and informed the participants before the start of the study that they have the right to withdraw from the study at any given time if they feel the need to. The researcher also provided the participants with consent form before carrying out the study. The researcher ensured the safety of all the participants and ensured that all the data was coded in order to ensure the anonymity of all the participants.

3.10 Summary

This chapter covered the research methodology which was applied in the study, subjects, instruments, data collection, and data analysis procedures. The target population as well as the sampling procedures, the data collection methods and analysis procedures were also explained. The next chapter looks at the presentation, analysis and discussion of the findings of the research.

CHAPTER IV: DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter focused on the presentation, analysis and the discussion of the data. The research was qualitative hence themes generated from the focus group discussions and the interviews were used to present, analyze and interpret the data. Tables were used to present the demographic information of the participants.

4.2 Demographic information of the participants

This section showed gender, experience and qualifications of respondents. These details, made it possible for the researcher to show characteristics of population under study and to validate the findings of the study.

Table 4.1 Distribution of HODs by gender, experience and qualification

HODs	Gender	Teaching experience	Qualifications
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HOD 1	Male	Above 5 years	- BA honours in Media and Digital Communication. PGDE in maths and Integrated Science.
HOD 2	Female	Above 5 years	- HBScEd maths and Dip in Edu Maths
HOD 3	Female	Above 5 years	- BED Curriculum studies and dip in education maths.

Table 4.1 shows that all the three HODs used in the study are degree holders. The table also shows that all the HODs have a relevant degree, diploma or post grad qualification in mathematics. The HODs are of mixed gender with two female and one male and are all quite experienced.

Table 4.2 Distribution of teachers by sex, experience and qualification

Teacher	Gender	Teaching experience	Qualifications
T1	Female	Below 5 years	- Diploma in Edu. (Maths)
T2	Male	Above 5 years	- Dip in edu. Sciences.
T3	Female	Above 5 years	- Dip in Edu (Maths)
T4	Female	Less than 5 years	- Dip in Edu (Maths)
T5	Female	Above 5 years	- Dip in Edu maths
T6	Male	Above 5 years	- Dip in Edu maths

Table 4.2 shows that the data was collected from well qualified mathematics teachers to teach ‘O’ level mathematics since five have diplomas in maths education. Only one of the teachers

specialised in science. The teachers are of mixed gender and experience with female teachers dominating.

4.3 The challenges faced by mildly mentally retarded learners in learning Mathematics in Chiredzi district.

The researcher asked the HODs of their views on the challenges faced by mildly mentally retarded learners in learning mathematics at their respective schools. HOD 1 had this to say

Mildly mentally retarded learners face challenges in understanding abstract concepts for example, numbers and quantities, algebraic expressions and equations like $2x+3=5$. Furthermore mentally retarded learners may fail to solve such simple linear equations.

HOD 2 emphasised that

Fear and anxiety are common problems with mentally retarded learners. This might be due labelling from other learners and lack of confidence. Mentally retarded learners also usually have memory challenges; they have poor retention of maths formulas and procedures. Attention and focus on maths problems is usually difficult for them to sustain.

HOD 3

Mentally retarded learners are characterised by fidgeting in class, cannot endure listening or paying attention for a long time. Most of them are usually very slow in writing exercises or tests or even in performing any maths task given.

Further on a similar question the mathematics teachers responded through the focus groups and were in agreement with their HODs. Additionally the researcher asked the teachers to also give the challenges they face when teaching mildly mentally retarded learners mathematics.

FG

Mildly mentally retarded learners have limited attention span and easily disrupted, limited understanding of time and schedules and have challenges in solving problems and reasoning abstractly. They also, have difficulties in working with other learners even in group work, have trouble with sequencing and organization and have poor time

management. Additionally, they have difficulties in understanding given instructions and they usually pursue own goals.

On the challenges they face when teaching mildly mentally retarded learners mathematics FG had this to say

Due to high teaching loads, we find less time to assist the mildly mentally retarded learners. Also, the mildly mentally retarded learners need more resources which the school cannot provide for example there is need for wifi or good network coverage for them to use videos and do online lessons. It is difficult for us manage slower learning pace and shorter attention span, address learning gaps and prior knowledge gaps, access specialized training and support appropriate teaching materials and resources, break down complex concepts into simplest terms and adapt instructions to meet individual needs. It's challenging to provide opportunities for practice and reinforcement communicate effectively with students and parents and deal with emotional and behavioural challenges.

4.4 Interactive teaching methods used in teaching mathematics to mildly mentally retarded learners, in Chiredzi district.

On the interactive teaching methods which are effective when teaching mathematics to mildly mentally retarded learners HOD 1 highlighted that

The effective interactive teaching methods that can be used when teaching mildly mentally retarded learners include hands on activities with manipulative materials, for example blocks, counting bears and geometry shapes.

HOD 2

Maths games such as maths scavenger hunt, storytelling and contextual learning for example using stories to illustrate maths concepts and arts and craft projects eg geometry arts can be used to deliver maths lessons to mildly mentally retarded learners.

HOD 3

Some interactive that can be used with mildly mentally retarded learners include technology integration in mathematics, maths software, online resources, educational apps, videos and online lessons.

However, the researcher went on to probe for the interactive methodologies being used by teachers when teaching mildly mentally retarded learners. HOD 2 complained that

Due to limited time and workloads, only few methods are being employed by teachers and these include collaborative learning and peer support through group work, experimental learning and fieldtrips.

HOD 3

Real life applications and problem solving in calculating change, using counters and collaborative learning and peer support.

HOD 1

Teachers are using music and movement activities in teaching mathematics to mildly mentally retarded learners.

The researcher went on to ask the teachers of the interactive methods that can be used to teach mildly mentally retarded learners as well as the once they are actually using in schools to teach the mildly mentally retarded learners.

FG

Interactive strategies such as role-play, simulations, experimental learning, group work, maths games and visual aids like videos can be used to teach mildly mentally retarded learners and are quite effective.

4.5 Perceptions of teachers on the use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners.

In order to gain a deeper understanding on how teachers perceive the use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners on acquisition of basic maths concepts and learning outcomes the researcher asked the HODs through interviews of the opinions.

HOD 1

Interactive methodologies are effective in improving understanding and retention of basic maths concepts, helpful in developing problem solving skills and critical thinking and motivate learners to learn maths.

HOD 2

Interactive methods build confidence and self esteem in maths abilities, encourage active learning and hand on experiences, foster a positive attitude towards maths learning and provide opportunity for immediate feedback and assessment.

HOD 3

When teachers use interactive methods the enhance learner autonomy, creativity, maths exploration and self directed learning leading to improved academic achievement and learning outcomes.

Further on the same questions the teachers through the focus group agreed with HODs' views and also gave their own perceptions.

FG 1 agreed that

Interactive methodologies enhance retention and memorization of facts, enhance collaboration and social skills development, reduce maths anxiety and increase enjoyment in learning mathematics.

4.6 The impact of the use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners.

The participants gave their views on how the use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners influence the acquisition of basic maths concepts and learning outcomes.

HOD 1

The use of interactive methods results in improved understanding and retention of maths concepts and better adaptation to individual learning, styles and abilities.

HOD 2

When teachers use interactive methods they result in learners developing hands on experiences and practical application of mathematics and boost the confidence and self esteem of learners in maths abilities.

HOD 3

Interactive teaching methods ensure a deeper understanding and retention of maths concepts; improve problem solving skills and critical thinking.

The teachers agreed with the HODs on this question on how the use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners influence the acquisition of basic maths concepts and learning outcomes.

FG went on to add that

Interactive teaching methods when teaching mildly mentally retarded learners result in increased motivation and improved attention and focus on maths lessons.

4.7 Discussion

The results presented show that mildly mentally retarded learners face challenges in understanding abstract concepts for example, numbers and quantities, algebraic expressions and equations like $2x+3=5$. This is in agreement with the views of Parmi & Irwandi (2020) that students with mental retardation are not able to count, recognize numbers and letters, spelling out the letters, and perform mathematical operations, such as sum and subtraction. The results also show that they fail to solve simple linear equations, have fear and anxiety due to labelling from other learners and lack of confidence. The results also show that mentally retarded learners usually have memory challenges; have poor retention of maths formulas and procedures, have difficult for them to sustain focus on maths problems and are characterised by fidgeting in class, slow in writing exercises or tests, difficulties in working with other learners even in group work, have difficulties in understanding given instructions and they usually pursue own goals.

The results also show the difficulties teachers face when teaching mildly mentally retarded learners. The results show that due to high teaching loads, teachers find less time to assist the mildly mentally retarded learners, learners need more resources which the school cannot provide, it is difficult for teachers to manage slower learning pace and shorter attention span, address learning gaps and prior knowledge gaps, access specialized training and support

appropriate teaching materials and resources, break down complex concepts into simplest terms and adapt instructions to meet individual needs. This is in line with the findings of Karagiannakis, Baccaglini-Frank and Papadatos (2014) that the other form of mathematics difficulties is concerned with poor learning methods or strategies. Also the results show that it is challenging for teachers to provide opportunities for practice and reinforcement communicate effectively with students and parents and deal with emotional and behavioural challenges.

The results presented show that the interactive teaching methods that can be used when teaching mildly mentally retarded learners include hands on activities with manipulative materials and maths games, such as blocks and maths scavenger hunt, counting bears and geometry shapes. The results are in agreement with Gunter, Kenny and Vick (2018) who put forward that puzzles are effective instructional materials in that they support children's developmental areas (cognitive, language, motor, social and emotional development), interests and needs, by providing an entertaining learning environment. The results also showed that storytelling and contextual learning, technology integration in mathematics, maths software, online resources, educational apps, videos, simulations and online lessons can be used to deliver maths lessons to mildly mentally retarded learners. This is in line with Kurvinen (2020) that Technology-enhanced learning (TEL) is one of the key tools that enriches educational productivity by integrating technological media into education and also develops a lifelong love of learning in students. The results also showed that not all the above mentioned methods are being used by teachers. Due to limited time and workloads, real life applications and problem solving in calculating change, collaborative learning and peer support through group work, experimental learning, and music and movement activities are the commonly used methods.

The results show that teachers and HODs perceive interactive methodologies as effective in improving understanding and retention of basic maths concepts, enhance learner autonomy, creativity, maths exploration and self directed learning leading to improved academic achievement and learning outcomes, help in developing problem solving skills and critical thinking and motivate learners to learn maths as they increase enjoyment in learning mathematics. The results are not in agreement with Bacon and Baglieri (2021) who established that some teachers have the conviction that special schools have more to offer and that they can relieve students from the stress of continuous performance pressure of failure and under achievement in regular schools. The results also show that the participants perceive that

interactive methods build confidence and self esteem in maths abilities, enhance social skills development, reduce maths anxiety, encourage active learning and hand on experiences, foster a positive attitude towards maths learning and provide opportunity for immediate feedback and assessment.

The results show that the use of interactive methods results in improved understanding, retention of maths concepts, develop hands on experiences and practical application of mathematics, boost the confidence and self esteem and better adaptation to individual learning, styles and abilities. The results also show that interactive teaching methods ensure improved problem solving skills and critical thinking, increased motivation and enjoyment in learning mathematics, improved attention and focus on maths lessons. The results are in agreement with Nekang (2016) that when played repeatedly, games support students' development of computational fluency. This shows the pivotal role played by interactive methods in the teaching of mathematics to mildly mentally retarded learners.

4.8 Summary

This chapter presented, discussed and analysed that data collected from the participants. The data showed that mildly mentally retarded learners have challenges in concentrating for longer periods and carry out abstract mathematical presentation and calculations. The chapter also reviewed that teachers use group work, maths games, technological based simulations as some of the interactive methods to promote engagement, motivating learners to learn and increase understanding of mathematical concepts. The next chapter explores the summary, conclusion and recommendations.

CHAPTER V: CONCLUSIONS, SUMMARY AND RECCOMENDATIONS

5.1 Introduction

This chapter outlines the summary, conclusions and gives recommendations of the study on the effects of interactive teaching and learning methods in the acquisition of basic maths concepts by mildly mentally retarded learners in sampled secondary schools in Chiredzi District. Recommendations were made basing on the main findings of the study presented in chapter four.

5.2 Summary of the Study

Chapter 1 introduced the study that sought to explore the effects of interactive teaching and learning methods in the acquisition of basic maths concepts by mildly mentally retarded learners in sampled secondary schools in Chiredzi District. The chapter outlined the background of the study, research aim, research objectives, research questions, delimitation of the study, and limitations of the study among other essential elements. The research was guided

by the following research objectives to: explore the difficulties faced by mildly mentally retarded learners in learning Mathematics, identify the interactive teaching methods used in teaching mathematics to mildly mentally retarded learners, explore the perceptions of teachers on the use of interactive teaching methods in teaching mathematics to mildly mentally retarded and investigate the impact of use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners. In chapter 2, the social constructivism theory of learning was discussed as the theory guiding the study and the literature relevant to the study was discussed in line with the research objectives. Chapter 3 discussed the research methodology. The study was guided by the interpretivist research paradigm and following a qualitative research approach and adopted the case study design.

In chapter 4 data was presented, analysed and discussed in line with themes generated from the data gathered through interviews and focus group discussions. The first question sought to find the difficulties faced by mildly mentally retarded learners in learning Mathematics. The responses show that mildly mentally retarded learners face challenges in understanding abstract concepts such as numbers and quantities, algebraic expressions and equations. They also have fear and anxiety due to labelling from other learners and lack of confidence, have memory challenges; have poor retention of maths formulas and procedures, have difficulty in sustaining focus on maths problems. Mildly mentally retarded learners are characterised by fidgeting in class, slow in writing exercises or tests, difficulties in working with other learners even in group work and difficulties in understanding given instructions. On the other hand the responses show that teachers find less time to assist the mildly mentally retarded learners due to high work loads, cannot provide more resources which the learners need and have challenges in managing slower learning pace and shorter attention span and adapt instructions to meet individual needs. The researcher also asked a question on the interactive teaching methods teachers use in teaching mathematics to mildly mentally retarded learners. The results show that teachers use hands on activities with manipulative materials and maths games, such as blocks and maths scavenger hunt, counting bears and geometry shapes when teaching maths to mildly mentally retarded learners. The results also show that storytelling and contextual learning, technology integration in mathematics, maths software, online resources, collaborative learning, peer support through group work, experimental learning educational apps, videos, simulations and online lessons are effective when delivering maths lessons to mildly mentally retarded learners. Thirdly, the researcher asked a question on the perceptions of teachers on the use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners. The results

show that teachers and HODs perceive interactive methodologies as effective in improving understanding and retention of basic maths concepts, enhance learner autonomy, creativity, maths exploration and self directed learning leading to improved academic achievement and learning outcomes. Furthermore interactive methodologies help in developing problem solving skills, critical thinking and motivate learners to learn maths as they increase enjoyment in learning mathematics. The interactive methodologies also build confidence and self esteem in maths abilities, enhance social skills development, reduce maths anxiety, encourage active learning and hand on experiences, foster a positive attitude towards maths learning and provide opportunity for immediate feedback and assessment of mildly mentally retarded learners.

Lastly the researcher asked a question on the influence of using interactive teaching methods in teaching mathematics to mildly mentally retarded learners. The responses revealed that the use of interactive methods result in improved understanding, improved retention of maths concepts, develop hands on experiences and practical application of mathematics, boost the confidence and self esteem and better adaptation to individual learning, styles and abilities. Interactive teaching methods also ensure improved problem solving skills and critical thinking, increased motivation and enjoyment in learning mathematics, improved attention and focus on maths lessons. The last chapter, chapter 5 summarized, concluded and made recommendations based on the research findings.

5.3 Conclusions

Based on the research findings the researcher concludes that: mildly mentally retarded learners face challenges in understanding abstract mathematical concepts, have fear and anxiety due to labelling from other learners, have memory challenges; have poor retention of maths formulas and procedures and have difficult in sustaining focus on maths problems. Mildly mentally retarded learners are slow in writing exercises or tests, have difficulties in working with other learners and understanding given instructions.

Teachers use activities with manipulative materials and maths games, such as blocks and maths scavenger hunt, counting bears and geometry shapes when teaching maths to mildly mentally retarded learners. Also the use of storytelling, contextual learning, maths software, online resources, collaborative learning, and peer support through group work, experimental learning educational apps, videos, simulations and online lessons are very effective when delivering maths lessons to mildly mentally retarded learners.

Interactive methodologies are effective in improving understanding and retention of basic maths concepts, enhance learner autonomy, maths exploration and self-directed learning leading to improved academic achievement and learning outcomes. Interactive methodologies are also pivotal in developing problem solving skills; enhance social skills, development critical thinking and motivating learners to learn maths.

The use of interactive methods result in improved understanding and retention of maths concepts, develop hands on experiences and practical application of mathematics, boost the confidence and self-esteem and better adaptation to individual learning, styles and abilities of mildly mentally retarded learners.

5.4 Recommendations

From the research findings the researcher recommends that:

- The ministry and schools should ensure that teachers are professionally trained to handle mentally retarded learners, given less work load and smaller numbers of learners to ensure that they can provide more resources, manage slower learning pace and adapt instructions to meet individual needs of the learners.
- Schools should have separate classes for mildly mentally retarded learners to reduce fear and anxiety due to labeling from other learners during learning and provision of prerequisite learning materials and a flexible learning program that suit their concentration span.
- Teachers should use interactive methods and activities with manipulative materials such as blocks, maths games, geometry shapes as scaffolding for better learning of mathematics when teaching mildly mentally retarded learners.
- The ministry and schools should enact enabling policies to foster the use of technology such as maths software, experimental learning educational apps, videos, simulations and other online lessons in order to motivate and increase engagement for mildly mentally retarded learners.

More research should be carried out on the best ways to ensure that the needs of mildly mentally retarded learners are met in the teaching and learning of mathematics.

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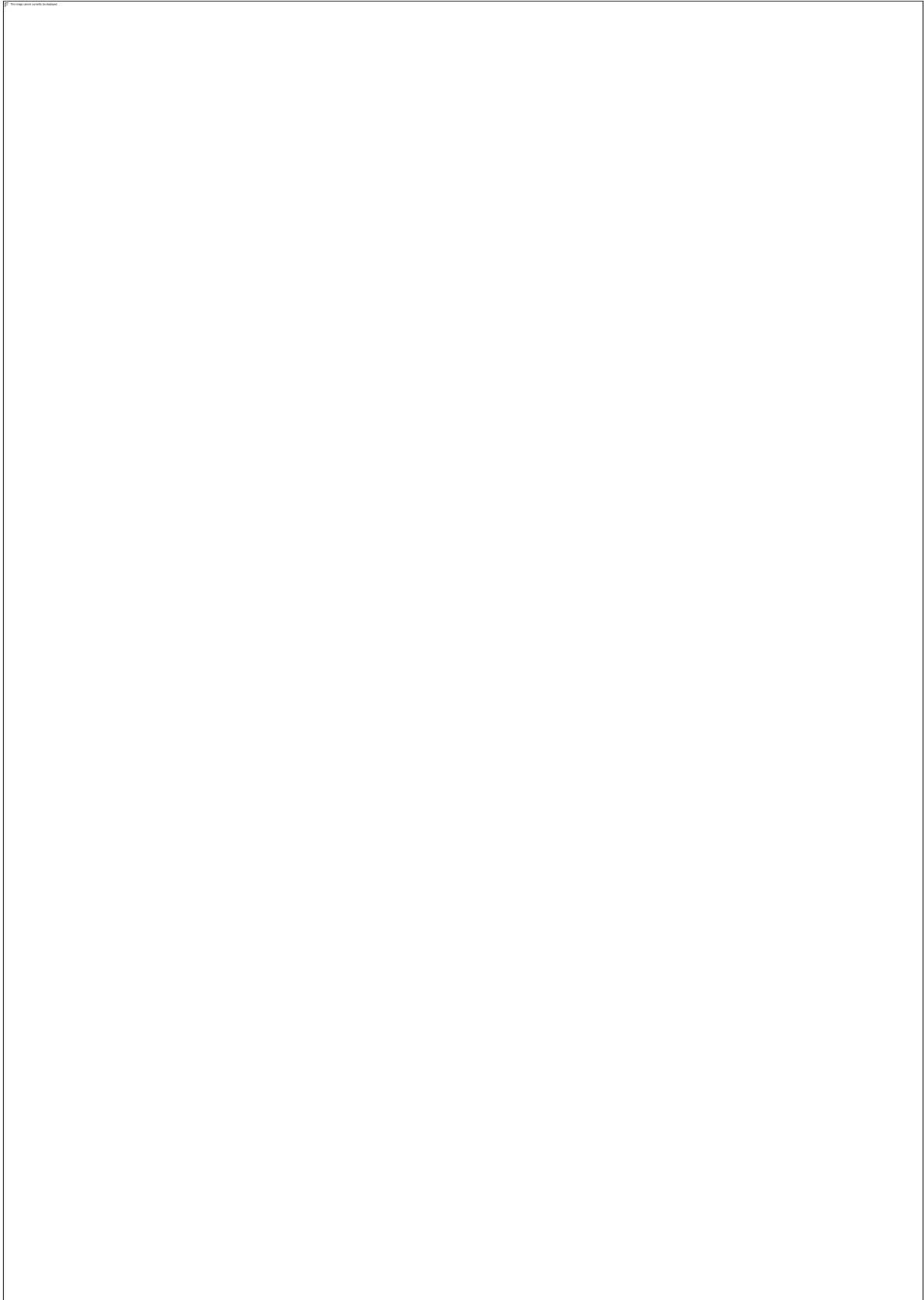
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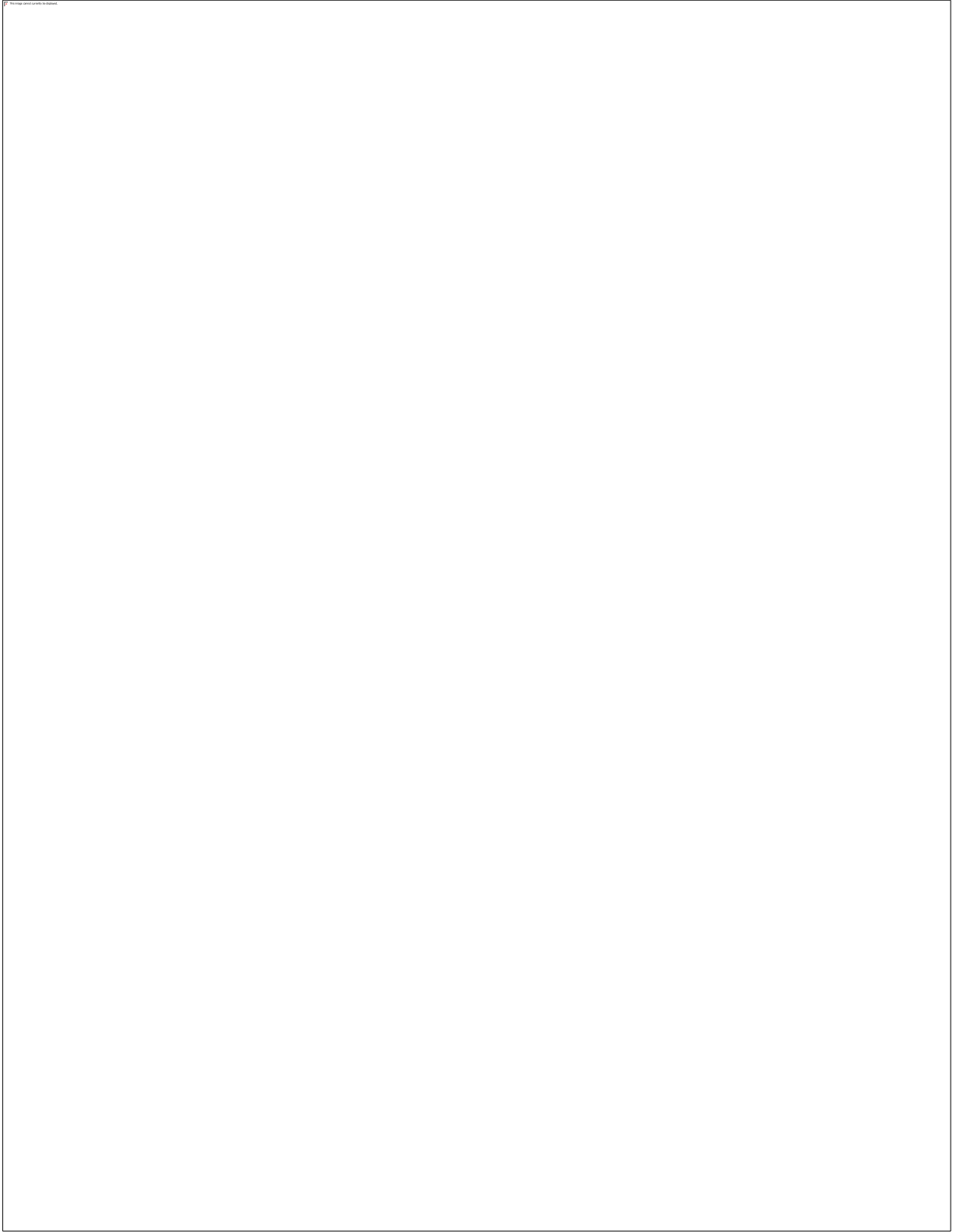
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Appendix A: BUSE research letter



Appendix B: Letter to Mope requesting permission to carry out the research





Appendix C: Interview guide for maths HOD's

1. What are the difficulties faced by mildly mentally retarded learners in learning Mathematics?
2. What are the difficulties faced by teachers in teaching Mathematics to mildly mentally retarded learners?
3. Which interactive teaching methods are effective when teaching mathematics to mildly mentally retarded learners?
4. Which interactive teaching methods are used by teachers in teaching mathematics to mildly mentally retarded learners?
5. How do teachers perceive the use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners on acquisition of basic maths concepts and learning outcomes?
6. How does the use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners influence the acquisition of basic maths concepts and learning outcomes?

Appendix D: Focus group discussion guide for maths teachers

1. What are the difficulties faced by mildly mentally retarded learners in learning Mathematics?
2. What difficulties do you face when teaching mildly mentally retarded learners in learning Mathematics?
3. Which interactive teaching methods do you use when teaching mathematics to mildly mentally retarded learners?
4. How do you perceive the use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners on acquisition of basic maths concepts and learning outcomes?
5. How does the use of interactive teaching methods in teaching mathematics to mildly mentally retarded learners influence the acquisition of basic maths concepts and learning outcomes?