

Hate for Mathematics

An explorative multiple case study into why some people develop a hate for mathematics

SEHRISH MUNAWAR

Supervisor
Pauline Vos

University of Agder, [2021]
Faculty of Engineering and Science
Department of Mathematical Sciences



Preface

Research on emotions is difficult, but it will help students to learn more effectively. Why students develop hate for mathematics subject is an important and challenging topic to study where a lot of work and effort has been invested. With this thesis, I learned and prepared myself for the challenges that I would face in the mathematics classroom. I will enter mathematics teaching with more confidence and knowledge that I got during this period.

This Master thesis marks the end of 2-year master's degree program in mathematics didactic at the University of Agder in Kristiansand, at the Department of Mathematical Sciences under the faculty of Engineering and Science. Every part of this master's thesis is original, including the research problem, structure, data collection and analysis.

I am very thankful to Agder University for providing me a chance to study here. My sincere and profound wishes for my supervisor Prof. Pauline Vos, always there to guide me with her motivational words, new ideas, and valuable suggestions throughout the work. Without her, it would have been much more challenging to overcome the difficulties and come up with this useful research.

At every stage I am very thankful to God for his blessing in the form of my brother Daniyal Ahmed and my sister Hina Munawar who support me in all thick and thin. Through their support, encouragement, and assistance, I can complete my degree in a new system and different culture.

Kristiansand, November 2021

Summary

People with good emotional stability are more likely to be effective in learning. Emotions and feelings are linked to social learning and thinking. Therefore, it is important to study why some people develop extreme negative feelings towards mathematics; few even develop hate for mathematics. In this study, I tried to find out how haters develop their hate and their reasons for it. From the literature, I identified reasons, such as boredom, humiliation, and stress from tests, and seeming irrelevance of mathematics to the real world. This study dealt with the research questions: what characterizes the participants' hate of mathematics, and possible reasons for this hate? This study collected data by interviewing six people. Three scales were also used to measure attitude and beliefs to generalize and compare the results.

I had two groups, one group of people who hate mathematics and the other group who hated mathematics, but their hate had faded. They developed their hate, amongst others, because of fear of being failed by teachers, corporal punishment, and favoritism, and being humiliated by their friends and family. The three in the second group overcame the hate because they saw some utility in mathematics. While in the first group, participants have reasons why they still have negative feelings, such as they don't need it, this subject still causes them to make them embarrassed, having painful memories, and are not willing to change their mindset.

Anger/fear and disgust are some characteristics found in their hate for mathematics. Analysis of two self-efficacy scales shows that other attitudes like GSE don't affect the performance of the mathematics subject. This study will help me teach mathematics in a better way, understand students' problems, and turn their attitudes and beliefs in a positive direction.

The implication of the results in mathematical education and suggestion for further research on this topic is also recommended in the last. In the end, transcriptions, instruments used in data collection, and references are provided.

Table of content

1. Introduction	1
1.1 Background of the study	1
1.2 Statement of the problem.....	2
1.3 Research questions of the study	3
1.4 Motivation for the study.....	4
1.5 Significance of the study	4
1.6 Structure of the study.....	5
2. Theoretical framework.....	7
2.1 Sociocultural theory	7
2.2 Self-efficacy.....	8
2.3 Affective domain	9
2.4 Emotions	11
2.4.1 Shame	13
2.4.2 Humiliation.....	13
2.4.3 Fear	14
2.4.4 Anger	15
2.4.5 Anxiety	15
2.4.6 Hate.....	16
3. Literature review	21
3.1 Mathematics.....	21
3.1.1 Mathematics involves emotions.....	23
3.1.2 The role of mathematics teaching.....	24
3.1.3 Unpleasant experiences of mathematics.....	24
3.1.4 Generic difficulties with mathematics as a subject	25
3.1.5 No friend and having no fun.....	26
3.1.6 Humiliation	26
3.1.7 Pointless mathematics.....	27
3.1.8 Remain still and listen	27
3.2 Math Anxiety	28
3.3 Parent’s role and child achievement.....	28

3.4 Learning styles	29
3.5 Mindset	29
3.6 Self-efficacy and learning	30
4. Methodology	33
4.1 Research paradigm.....	33
4.2 Data collection	34
4.3 Instruments for the study	36
A. General self-efficacy scale	36
B. Math self-efficacy scale.....	37
C. Semi-structured interview	37
D. Rempel list for hate.....	38
4.4 Choice of method.....	38
4.5 Preparing for data collection.....	39
4.6 Plan for data analysis	40
4.7 Reliability and validity of data	42
4.8 Ethical considerations	43
5. Results and analysis.....	45
A. Analysis of qualitative part	45
5.1 <i>Ali</i>	45
5.1.1 The social aspects	45
5.1.2 Affects.....	46
5.1.3 Why still hate mathematics	49
5.2 <i>Anashe</i>	51
5.2.1 The Social aspects.....	51
5.2.2 Affects.....	52
5.2.3 Emotions	53
5.2.4 Why still hate mathematics	55
5.3 <i>Hajara</i>	56
5.3.1 The Social aspects.....	56
5.3.2 Affects.....	57
5.3.3 Emotions	58
5.3.4 Why still hate mathematics	60
5.4 <i>Kristina</i>	61

5.4.1 The Social aspects.....	61
5.4.2 Affects.....	62
5.4.3 Emotions	63
5.4.4 Change in Perception	65
5.5 Laila.....	67
5.5.1 The Social aspects	67
5.5.2 Affects.....	68
5.5.3 Emotions	69
5.5.4 Change in perception	71
5.6 Karen.....	72
5.6.1 The Social aspects.....	72
5.6.2 Affects.....	73
5.6.3 Emotions	74
5.6.4 Change in perception	76
5.7 Explanation of triangle of hate.....	77
B. Analysis of quantitative data	79
5.8 Self-efficacy scales	79
5.9 Statement of hate	85
6. DISCUSSION ON RESULTS.....	89
6.1 Cross case study.....	89
6.1.1 Cross-case study of qualitative data.....	89
6.1.2 Cross-case Analysis for Quantitative Data:	94
6.2 Discussion.....	96
7. CLOSING	101
7.1 Conclusion	101
7.2 Implementation on school.....	103
7.3 Limitation	105
7.4 Further study.....	106
Reference	109
<i>Appendix 1</i>	<i>113</i>
a. Information Letter.....	113
b. Permission from NSD.....	116
<i>Appendix 2 (Interview Protocol)</i>	<i>118</i>
a Introductory meeting	118

b	Interview guide.....	119
c	General Self- efficacy scale	121
d	Math self-efficacy scale	122
e	Select from the List	123
	<i>Appendix 3 (Transcripts)</i>	125

Group 1

<i>Ali</i>	125
<i>Anashe</i>	130
<i>Hajara</i>	136

Group 2

<i>Kristina</i>	142
<i>Laila</i>	146
<i>Karen</i>	152

CHAPTER 1

Introduction

Mental well-being supports people in successfully achieving day- to- day challenges. Mental well-being is related to emotions and feeling, and which play a pivotal role in social learning and thinking. For my master's thesis, I investigated students' emotions and challenges in school learning, specifically mathematics; in particular I focused on highly negative emotions related to mathematics.

1.1 Background of the study

There is no doubt that mathematics is very essential for human needs. The first mathematical artifacts found by archeologists are more than 40 thousand years old and were probably used for counting the days between full moons and serve a need to keep track of time (Beaumont & Bednarik, 2013). Mathematics as a subject has become a significant science in which numbers, shapes, patterns, and the relations between them are studied. Mathematics has become an essential school subject for students all over the world. The school subjects of mathematics serve as a stepping stone for entering the job market. So, students must study this subject to complete their education whether they like or hate it.

Mathematics is a unique subject that plays a vital role in many fields of human life. Many technological developments are based on this subject. Many people use it consciously or unconsciously on a daily basis. Mathematics is used in managing house budgets, shopping, preparing food, traveling, sports, banking and many more sectors of life. Devlin (1998) claimed that *“The patterns of mathematics are found all around us, from the smallest particles to the farthest reaches of the universe, as in the symmetrical rings of this supernova explosion”* (p, 2). However, mathematics is often hidden. For example, cars have many instruments on the dashboard that display numbers and scales, but we do not perceive their reading as ‘doing mathematics’. Similarly, dressmakers use mathematics to prepare dresses, cooks apply mathematics in the kitchen, and even our clock requires mathematics to work correctly.

Although mathematics is dominant worldwide, it is observed that the subject of mathematics at schools is not popular with students (Stodolsky, 1988). Some individuals have negative

feelings and attitudes toward mathematics, such as fear and frustration. So, in this context, I embarked on a study to investigate the highly negative feelings and attitudes towards mathematics that students can have, why the students developed these feelings and attitudes, and the reasons for this. In short, this thesis is about students who hate mathematics.

1.2 Statement of the problem

Past studies showed that students have negative attitudes and feelings towards mathematics (Philippou & Christou, 1998). Skaalvik (2013) concluded that negative attitudes and feelings are negatively related to learning mathematics, and this relation occurs in two directions: (1) low attainments lead to negative attitudes and feelings, and (2) negative attitudes and feelings lead to low attainments. To break this cycle and assist students in learning and enjoying the subject, it is essential to know more about the causes of negative attitudes and feelings.

Fotoples (2000) gives several reasons for hateful attitudes and feelings about mathematics. These may be due to the influence of family, friends, and teachers but may also be caused by an unpleasant history of mathematics or past bad experiences. Maybe these negative attitudes and feelings built up slowly and became stronger and stronger, culminating in hate. I asked myself whether math hatred is a primitive attitude based on false perceptions and how it develops.

My study started from another master's thesis, Habberstad (2019), which describes a study on three adults who had a hateful attitude toward mathematics. Their hate was calm hate with the desire to dodge mathematics, not destroy it or kill the people involved in its teaching. These adults had a desire to keep a distance from mathematics. One of them remembered that she threw the books and felt being able to harm the teachers. The three participants in this study were interviewed extensively and tested for their mindset (Li & Bates, 2019). They showed to have a change mindset and not a fixed mindset. Also, the participants showed confidence in their lives in general; they were good students in subjects other than mathematics. Their peak of hate occurred in tutoring and testing situations; they felt to survive mathematics and often cheated or copied. In this master's thesis, I intend to extend the work of Habberstad (2019).

1.3 Research questions of the study

The study aimed to find out the reasons behind mathematics hate and how students started to hate it. I identified two types of people who hate mathematics: those who continue to hate mathematics into adulthood and those whose hate has dwindled. I will compare their reasons. The following research questions guided my study:

1. How did the participants develop hate for mathematics?
2. What are their reasons for hating mathematics?
3. What characterizes the participants' hate of mathematics?
4. Is there a relation between hating mathematics and other attitudes, such as self-efficacy (explained in the theoretical framework)?
5. What differences can be observed when comparing those who still hate mathematics with those whose hate faded over time?

The first two research questions focus on personal stories that relate to origins and reasons for hating mathematics. For detailed answering of these research questions, used a qualitative research method.

The third research question involves mapping the participants' hate feelings to a scale of hate developed by Rempel (2019).

Since emotions and capabilities vary from person to person, I wanted to see whether the participants had specific capabilities. I tested them using a general self-efficacy scale and a "mathematics self-efficacy" scale. These instruments aimed to inform me how confident the participants were in handling routine problems and solving mathematics problems, respectively. The fourth research question addresses this.

Finally, the fifth research question addresses the comparison between the two groups of participants, those who continue to hate mathematics into their adulthood and those whose hate has dwindled.

1.4 Motivation for the study

I was very astonished when I heard that someone could hate mathematics. I thought hate would be a word that is too strong and maybe irrational to use for a school subject. However, I discovered that hatred of mathematics could exist. I realized it when I had the opportunity to teach children in Pakistan for a while. During my teaching period, I saw that sometimes the children's parents could not help them with mathematics. These children had to learn it on their own or take extra classes out of school hours. These extra coaching classes were a burden for them and gave them stress. I saw them become frustrated when they sacrificed their relaxing time and spent more time learning mathematics.

When the topic of mathematics hatred caught my eye, it amazed me that in a developed country like Norway, where the education system is higher than in underdeveloped or developing countries, hatred towards mathematics also exists. I had not expected this when mathematics is taught better and more flexibly with various facilities and exciting methods. Independent of colorful activities and trained teachers, people worldwide can develop hatred and a negative attitude toward mathematics. This gave me a reason to study hate mathematics. As a mathematics teacher, I felt a need to study this problem. If we know more about mathematics hate, we can maybe find ways to teach mathematics better, both in Norway and in my country.

1.5 Significance of the study

People are not born with hate for mathematics. I assume that a person's hate of mathematics is related to their mathematics encounters, whether at schools, tutoring sessions, daily life (e.g., making shopping choices), and social interactions (e.g., how peers and relatives talk about mathematics). I also assume that there is no intent to make students dislike, fear, or even hate the subjects taught within the educational system.

Mathematics is an essential subject in schools. In most countries, it is compulsory up to a certain age and in Norway until grade 10 (UDIR, 2020). In Norwegian classrooms, the students are encouraged to use different working methods, to work theoretically and practically. They learn that mathematics is a valuable and relevant tool when working practically (UDIR, 2020). Despite the ideals in teaching mathematics, many Norwegian students still think it is stressful and frustrating (Pepin, 2011). This discrepancy asks for

studying students' problems and why their negative attitude can occur, although facilities and friendly environments are available for students in the mathematics classrooms.

I have observed that students put their efforts into doing well in other subjects instead of in mathematics. There seem to be differences in mathematics and other subjects. There is no anxiety of English or anxiety of geography in the literature, but there are studies on mathematics anxiety (Tobias, 1987). McLeod (2005) stated that “*There is a tendency to believe that learning mathematics is a question more of ability than effort. Adults are willing to accept poor school mathematics performance, but they are unwilling to accept poor performance in other subjects*” (p, 575). It is also observed that both adults and children often express their lack of knowledge and ignorance in mathematics as a success without embarrassment, shame, and guilt (McLeod, 2005). So, mathematics plays a different role than other schools' subjects about attitudes and beliefs. In my study, I want to explore this further, in particular, to assist mathematics teachers. If I can find the roots of the problem, it can yield advice to teachers on how to teach mathematics better. This research will maybe let teachers know their mistakes and find advice on avoiding making these mistakes in the future. Therefore, this research work has significance to teachers in understanding why students developed hateful feelings and negative attitudes toward mathematics.

I hope my research will help students, so they can learn mathematics without stress and without developing negative feelings for mathematics. Past studies have shown that students have negative attitudes toward mathematics, but there is little research on extreme emotions like hate. This lacks research gives significance to my study.

1.6 Structure of the study

This thesis is divided into seven chapters. There are many aspects of hatred towards mathematics, and we cannot study all aspects in single research work. In chapter 2, I discuss different theoretical notions that will assist me in framing my research. “*The affective domain*” is used to study an individual's beliefs, attitudes, emotions, and feelings towards the subject of mathematics.

“*Social-cultural theory*” guides me to analyze the culture of teaching (norms, conventions, etc.) and the social aspects of the hatred toward mathematics.

Furthermore, I will explain in this chapter the duplex theory of hate, which categorizes different types of hate. Another notion discussed in this chapter is “*self-efficacy*” as an aspect of observational theory by Albert Bandura. It will help me find an individual's perceptions about their abilities in daily life problems. This chapter will also summarize relevant literature reviews on emotions, anxiety, fear, shame, anger, and hate.

Chapter 3 contains a review of empirical studies and will summarize research work about students' mathematical difficulties; this chapter and the researchers tried to study mathematics through students' eyes.

Chapter 4 describes the research methodology, data collection modes, data analysis procedures, and tools, Will give the selection of participants and details of all participants according to the ethical rules. The choice of methods and will analysis data is also argued in this chapter.

Chapter 5 will present the findings of the research. Chapter 6 will discuss the findings, and Chapter 7 will show the study's conclusions and implications.

CHAPTER 2

Theoretical framework

The chapter explained the theories that will cover the current study. This chapter starts with the sociocultural theory of how the social environment plays a vital role in children's learning and development, will discuss a person's ability to handle any particular situation with confidence in the paragraph about self-efficacy. After that come a paragraph about the practical domain, which include beliefs, attitudes, and emotions. In that paragraph, I explain some fundamental emotional theories relevant to this research work. Finally, the chapter presents a duplex theory of hate and other dimensions of hate with the help of Rempel's study for hate.

2.1 Sociocultural theory

Today's children are tomorrow's future leaders and representatives of society. Many theories explained children's development and helped us to give them better learning. Vygotsky (1978) explained his thoughts about how human cognitive and higher mental functioning developed in his sociocultural theory. He was a psychologist known for his work on children's cognitive development while learning. According to him, social and cultural interaction plays a vital role in a child's emotional and cognitive development (Wells, 1999). The activities children learn from their surroundings are internalized through the mediation of tools like language (Aimin., 2013). All higher mental functions are developed by social interaction where speech is essential for a child thinking and developing ideas, and speech development has different stages. Language has a central role in a child's teaching (Wells, 1999). Mediation, internalization, and zone of proximal development are a few aspects of Vygotsky's theory.

Zone of proximal development

The zone of proximal development is one of the central concepts of Vygotsky's genetic theory of human development. The ZPD is defined by the difference between a child achieving the task in two levels: independently and dependently. Instruction only assists the child in performing the job and is considered motivating and raises him (Wells, 1999).

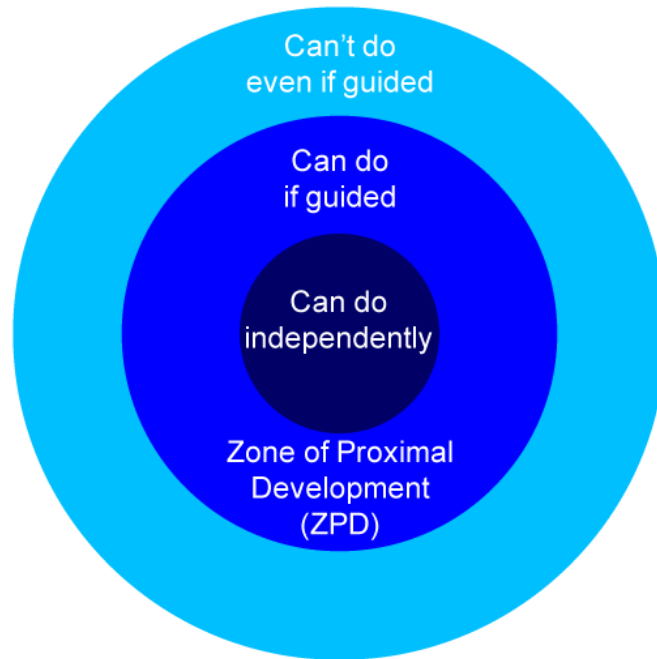


Figure 1. *Zone of Proximal development*

Wells (1999) also discusses an example from Vygotsky’s work: if a teacher is working with a child on a question, he explains, informs, and encourages the child to solve it himself. Later in a test, the child solves the problems independently due to assistance that he got earlier in the classroom. *“The distance between the actual developmental level as determined and independent problem solving and the level of potential development as determined through They are problem-solving under adults’ guidance or collaboration of more capable peers”* (Vygotsky, 1978, p. 86). The sociocultural theory describes two development levels. The first is the actual development level; at this level, the child can do tasks independently. The second is the future development level, which is achieved with the help of scaffolding provided by the more knowledgeable others. They can be peers, instructors, or any capable person (Aimin, 2013).

2.2 Self-efficacy

Self-efficacy beliefs or self-perceptions are the beliefs that a person holds about their abilities, motivation, and capacity to handle a problem (Schunk, 2010). Social theories explain how external factors cause making changes in individual behavior. Bandura (1973) explains shifts in behavior with self-regulation, having many components. Self-efficacy is

one of the significant determinants of self-regulation, how one's perception, beliefs, attitude, and ability toward pursuing a problem (Grusec, 1994).

Self-efficacy is an integral part of an observational theory by Bandura (1973). In this work, only one aspect of the observational approach is used, which is self-efficacy. Self-efficacy is attitude and different from self-esteem and self-concept and is more related to beliefs. For example, how do I feel when doing a task? In terms of mathematics, self-efficacy mostly revolved around, can I solve this problem or not? So, these are different terms. Students' belief (negative or positive) about themselves about the capacity of doing something is essential. When a person experiences negative thoughts, these affect their self-perception of negativity and foster negative emotions (Schunk, 2010). Negative self-efficacy is a negative self-perception, involves quit or leave the situation without trying to do it. It is related to believing that one cannot achieve the target, cannot solve the case, and cannot perform well without putting any effort into the problem is a low or negative efficacy (Grusec, 1994).

A person with low self-efficacy avoids facing new and challenging situations due to a lack of confidence in his ideas and feeling that one is incapable of and can't control the situation. People with high or positive self-efficacy choose different and challenging tasks to explore the environment. Once they select a challenge, they try to show their best by remaining consistent and creating a new and suitable environment (Schwarzer, Bäßler, Kwiatek, Schröder & Zhang, 1997). Emotional states such as anxiety, depression, stress arousal, mood swings, fear, and many more are related to self-efficacy (Gemzøe, Einarsen, 2002). It also determines how one puts effort into solving a problem. Negative self-efficacy can be one cause of hating mathematics, and it will be helpful if I can find out which type of perception participants have.

2.3 Affective domain

Learning is influenced by many factors, which can be cognitive or practical. Here, we are concentrating on the affective (mood, feelings, attitudes, beliefs) side. Affect, and cognition is different; this concept emphasizes how physical and mental processes are connected. Cognition is something happening in mind or related to cognitive skills to build a schema and use it to develop attitudes about different things we interact with in life. The effect is a psychological term used for feelings and refers to moods, feelings, and emotions. According to Mcleod (2005), beliefs, attitudes, and emotions describe a wide range of affective responses, and these affective issues play a central role in learning mathematics. All these

terms vary in the stability of affective response. Beliefs and attitudes are generally stable, cognitive in nature, and developed over a long time. On the other hand, emotions may change rapidly and are little cognitive, appear and disappear quickly like the frustration of doing the challenging mathematical task can be followed by joy. Affective domain, particularly in mathematics education, beliefs, attitudes, and emotions are complexly interrelated to cognition.

Past studies showed that beliefs and attitudes are essential factors in learning and teaching. Beliefs about self, opinions about mathematics and education, and beliefs about social contexts play a significant role in learning mathematics. Attitude refers to affective responses expressed in negative and positive feelings. Attitude towards mathematics is not one-dimensional, and students have different feelings towards a different kind of mathematics context, material, and learning styles. In general, we will discuss mathematics with specific emotions. In mathematics education, negative feelings, moods, frustration, anxiety, and dissatisfaction are observed in solving mathematical problems. Therefore, these emotions should be discussed while studying mathematics attitudes and beliefs (McLeod, 2005).

Category	Examples
Beliefs	
<ul style="list-style-type: none"> • About mathematics • About self • About mathematics teaching • About the social context 	<ul style="list-style-type: none"> • Mathematics is based on rules • I am able to solve problems • Teaching is telling • Learning is competitive
Attitudes	<ul style="list-style-type: none"> • Dislike of geometric proof • Enjoyment of problem-solving • Preference for discovery learning
Emotions	<ul style="list-style-type: none"> • Joy (or frustration) in solving nonroutine problems • Aesthetic responses to mathematics

Table 1. *The Affective Domain in Mathematics Education*

2.4 Emotions

Most sociologists agree that emotions have a powerful force that changes one's direction and can change societies positively or negatively (Scheff, 2000). "*Emotion is very complex in their origin and their effect*" (p. 3). Some emotions are misunderstood and go in a negative direction if they are not expressed appropriately. Emotions and ways of expressing these emotions are building blocks of one's personality (Bhave & Saini, 2009). These emotions arise in our daily reactions to unpleasant or pleasant situations and shared common characteristics within our species. Ekman (1992) used the word "*family*" for emotions by dividing them into nine other features for basic emotions. Later he claimed emotions must have 12 universal features standard for basic emotions like anger, fear, surprise, sadness, disgust, and contempt having distinctive signals. Primary emotions are different from other strong emotions because they are universally recognized, distinguishable (Ekman & Cordaro, 2011). Turner and Ortony combined different scholarly thoughts in a table that is given below, explained primary emotion. (Kerkeni, Serrestou, Mbarki, Raoof, & Mahjoub, 2017).

Theorist	Basic emotions
James (1884)	Fear, love, grief, rage
McDougall (1926)	Anger, elation, fear, disgust, subjection, wonder, tender-emotion
Watson (1930)	Love, fear, rage
Arnold (1960)	Love, fear, anger, aversion, courage, dejection, desire, despair, hate, sadness, hope
Mowrer (1960)	Pain, Pleasure
Izard (1971)	Fear, anger, contempt, joy, distress, guilt, interest, shame, surprise, disgust
Plutchik (1980)	Fear, Acceptance, anger, anticipation, disgust, sadness, surprise, joy
Ekman, Friesen, and Ellsworth (1982)	Fear, anger, disgust, joy, sadness, surprise
Gray (1982)	Rage and terror, anxiety, joy
Panksepp (1982)	Fear, expectancy, rage, panic
Tomkins (1984)	Fear, anger, interest, contempt, disgust, distress, shame, surprise, joy
Weiner and Graham (1984)	Happiness, sadness
Frijda (1986)	Desire, happiness, interest, surprise, wonder, sorrow
Oatley and Johnson-Laird (1987)	Anger, disgust, anxiety, sadness happiness

Table 2. *A selection of lists of basic Emotions*

In the current study, these negative emotions are discussed that have developed so strongly that to express dislike for a subject like mathematics, people have extreme negative emotions like hate and use highly emotive language to describe this hate.

Expressing emotions

Emotions can be read easily from facial expressions, and these facial expressions almost have the same expression for basic emotions all over the world. They may differ in action,

behavior, and culture, but the main pattern and characteristics almost remain the same everywhere. The feelings have a positive and negative effect on any psychological and physical state.

In mathematics classrooms, emotions can be seen through one's body state; for example, in a mathematics classroom, student's fear of doing mathematics makes them sweat, and they try to hide their sweaty fear behind the sweaty cloth. Some students want to sit back in the class as mathematics is meaningless and unmotivated due to a lack of connectedness with daily life (Bibby, 2002). In feelings of shame, bodily experiences involved lowering the gaze, covering the face, staying quiet, hiding is some physical signs. Shame motives tried to change the dishonorable situation by denying and hiding it through self-control (Tangney & Fischer, 1995).

2.4.1 Shame

Although all emotions are socially connected, shame, guilt, embarrassment, and pride arouse with the social interaction. In shame, it is related to personal failure directed toward the self that *"I am unworthy, incompetent or bad"* (Tangney & Fischer, 1995 p. 117).

Bibby (2002) writes that shame is a painful emotion that everyone wants to avoid. Lack of vocabulary, contexts, and nature of questions are three sources to arouse guilt while doing mathematics. Students want to do things but are incapable of doing the task and afraid to reveal their lack of knowledge. Some students feel shame while doing mathematics because they always think their knowledge is not related enough to others or doesn't match the standard.

Emotions refer to three facets *"physical signs," "subjective experiences,"* and *"action tendencies"*. In subjective experiences, feelings are small and heavy. Any person reacted by leaving the situation or blaming others for these painful negative emotions may be having little difference across cultures, but these emotions are experienced by all people (Tangney & Fischer, 1995 p. 67). Shame has a central role in society, and we cannot ignore the causes of its arousal. It has a connection with social context; for a deep and detailed study, we must see its social aspects (Scheff, 2000).

2.4.2 Humiliation

Humiliation and shame are entwined where personal integrity is at risk. Shame is the "master emotion" in creating conflicts. If one's self-esteem and identity are tried to crush in the

audience's presence, one will feel humiliated (Scheff, 2000). The experience of humiliation and the fear of humiliation damaged the sense of self and wholeness. "*Humiliation is what one feels when one is ridiculed, scorned, held in contempt*" (Klein, 1991 p.23). It acts like poisons to destroy relationships and leads to mental illnesses that cause anti-social behavior like suicide and murders (Donald, 1991). As emotions are often irrational, humiliation is a sort of emotion that compelled brutes and senseless acts. Past literature showed that audience is not necessary for humiliation and seems odd with the idea of private humiliation; when we think humiliation in general, we always have a public and audience of different types. Fear of being humiliated works with shame and guilt in social control as it involves having no power in a group. Powerlessness, lack of success, insults and unfulfilled challenges, the social base of humiliation, and belief and desire (define it as evil and alien.) are some aspects of being humiliated (Silver, Conte, Miceli & Poggi, 1986).

2.4.3 Fear

Fear is vital for survival; it serves as a protective device for all living beings on the earth (Furedi, 2006). Fear is copious as it needed emotions; it warns the individuals that something terrible is approaching and better-undertaken measures to avoid it. Fear is a reaction to external danger to an object (wild animal), an event (earthquake), a situation (in the mathematics classroom, horror movie) felt to be threatening. Apprehension, dread, panic, and terror are four levels of fear severity defined in the English language. Apprehension and panic are related to fear, as apprehension refers to mild anticipation of something terrible. Panic refers to a strong sense of being scared. It involved physiological arousal (e.g., increased heartbeat, labored breathing) (Akhtar, 2018).

Fear triggers anger. If one has a physical and psychological fear, then this fear sets off the offense. Sometimes, this fear hurts the subject if the situation is against or worst to whom we care a lot and want to secure ourselves (Ekman & Cordaro, 2011). Fear can cause local (prevent the use of knowledge) and global (do not want to make any commitment) failure. Fear is a factor that leads to students' local and global collapse. It is also associated with unfortunate events that affect feelings, and students are terrible at making mistakes, which leads them to lose their vision. Fear of mathematics is dependent on students' beliefs about self-perceptions and their success (Martino & Zan, 2013).

2.4.4 Anger

Frustration, stress, depression, and insecurity can transform into anger. Anger is one of the solid emotional states; when one is not finding a way to solve the problem and circumstances are not favorable, people get angry quickly. It is a normal reaction to things that we cannot bear or against our nature, and we encounter it almost everywhere (Bhave et al., 2009). Jealousy and disgust are emotions that lead to anger. Disgust can make you hurt, upset, and even angry. Anger is provoked by people whose actions are offensive. Jealousy involved other people. The jealous person feels many emotions, such as anger not meeting the expectation, fear of losing, and sadness to break the commitment (Ekman & Cordaro, 2011). Internal and external factors can cause anger. Internal sources can be unpleasant memories, depression, and nervousness. At the same time, poor parents' understanding, social stress, insecurity are external sources (Bhave et al., 2009).

Anger and shame are linked with each other in terms of externalization: pointing out other people related to the situation or external factors. It can be short-term to reduce the pain of these negative self-conscious emotions at that time (Tangney & Fischer, 1995). Frustration, stress, and depression are common in mathematics classrooms. Students who didn't understand any mathematical task or procedure feel helpless and frustrated. It's a normal emotion, and anyone faced it in daily life. Frustration is the ability to overcome negativity and continue a task without losing courage. If students lose their grip on frustration, it leads them to stress and then depression. When his goal, desires, task, get blocked, these feeling converts into strong negative emotions like anger, depression, and even hate (Bhave, et al., 2009).

2.4.5 Anxiety

Anxiety is the feeling of nervousness or unease happening inside an individual. Freud (1924) defined anxiety as "*something felt.*" Anxiety includes pressure and stress (Spielberger, 2010). Anxiety is an emotional state consisting of tension that heightened autonomic nervous system activity (Spielberger, Reigosa, & Urrutia, 1971). Anxiety and fear have common characteristics. It can be related to insecurity, and anxiety alters the inner world's danger like losing someone's loved, losing respect, rank, dignity in society, and fear of something unpleasant. Anxiety became more aggressive. It turns into a phobia. Anxiety and fear coexist within a phobia, although both are different in pure form (Akhtar, 2018).

Mathematics anxiety describes feelings of apprehension, tension, or discomfort experienced by many individuals when performing mathematics or in a mathematical context (Richardson & Suinn, 1972). It has been associated with cognitive difficulties performing mathematical tasks, potentially because anxiety interferes with our ability to hold and manipulate information in the mind (working memory) but is predominantly an emotional problem (Ashcraft & Krause, 2007). Scarpello (2007) reports that seventy-five percent of Americans stop studying mathematics and stay away from many careers related to mathematics. He identifies mathematics anxiety as one of the main reasons for this. Although theories and measurement instruments vary considerably in the differentiation of math anxiety, nearly all agree on three facets found within it: test, classroom, and numerical anxiety (Blazer, 2011).

2.4.6 Hate

“*Hate*” is arguably one of the most reactive words in the English language, and hate is potent, something people feel and try to show in their actions. It promotes the desire to harm others and be hated as a victim, and hate is a perpetrator (Rempel et al., 2019). In all respects, “hate” is a four-letter word. It is a confusing term and not easy to study. It is an adverse experience where the target is constantly under threat of being subjected to mental, emotional even physical harm (Rempel, et al., 2016).

Hate is thought of as a single emotion, and it is such a strong emotion that it takes people to any extreme for the satisfaction of their inside. As action speaks louder than words, terrorism, massacres, and genocide are results, which show how to serve the feeling of hate when translated into action. “*Feelings may or may not translate themselves into actions, and actions may or may not represent genuine feelings*” (Sternberg, 2003, p. 306). People’s interpretation of the feeling of hate into action showed differently, although having the same emotion. These feelings cannot translate into steps, and action may or may not show appropriate feelings. Translation of feelings through verbal expressions, behavior, feelings, pattern, cultures, and actions varies from person to person. Some people showed a less weird attitude, while others’ actions are intense to express their feelings (Sternberg, 2003). The act of expressing one’s emotions varies. Still, every perpetrator has some psychological changes.

According to Rempel (2016), those who wish to harm others unintentionally harm themselves by activating their autonomic nervous system, which increases adrenaline, blood pressure, heart rate, and respiratory rate.

Duplex theory of hate

Story-based theory and the triangular theory of hate are two parts of the duplex theory of hate, introduced by Sternberg (2003) for the deep understanding of hate, how hate arises, and its development. The duplex's theory of hate deals with both the structure of hate and the interaction of feelings and actions, and this theory applies to both individuals and groups hate. Within the duplex theory of hate, the first part, the triangular theory of hate, was proposed to structure aspects of hate. Hate is not a single emotion; it has different types with different patterns of feelings and actions. The triangular theory of hate distinguishes between the action triangle and the feeling triangle. Whatever we do in response, which is an action or behavior.

The figure 2 shows three components that characterize hate: the first component in the triangular theory of hate is "*Negation of intimacy*," characterized by repulsion and disgust. Feelings of closeness, warmth, communication, support, and respect are related to intimacy, where an individual seeks psychological and physical distance from the things he hates. These feelings develop gradually and are slow to dissipate. The second component is "*Passion*," which is characterized by anger and fear. The individual feels fear when he gets angry, whether one will control his feelings, behave, or avoid the situation. Feelings of longing, desire, and need are related to passion. These feelings develop rapidly and decline quickly. The third component of hate is "*Decision-commitment*," which is characterized by cognitions of devaluation and diminution. A hater is likely to feel contempt towards the target. The third component is cognitive, so that can learn it from social interaction. It develops slowly and dissipates slowly.

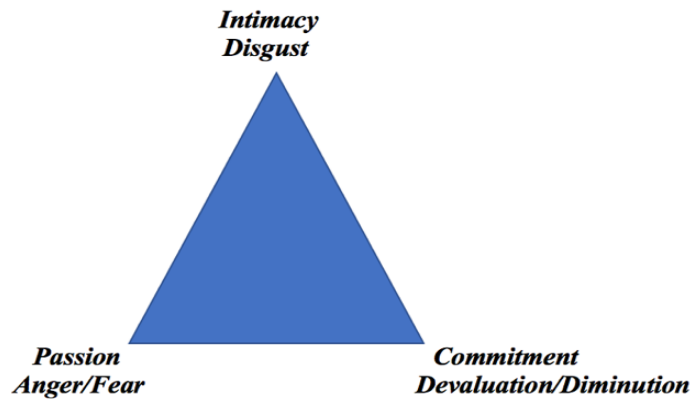


Figure 2. *The triangle of hate*

A combination of intimacy, passion, and devaluation in different ways gives seven different types of hate shown in the table 3. These types can overlap each other, but they are different from others in pattern and characteristics. For example, great hate has nothing for the targeted group. Hot hate shows a reaction to run away or attack the target. Cold hate leads to feelings of unworthiness towards the target group. Boiling hatred has feelings of disgust while simmering hostility having feelings of loathing toward the target. Seething hates having's feelings of revilement towards the groups. Burning hate combines all three components of hate where haters feel to annihilate the enemy (Sternberg, 2003).

Within the duplex theory of hate, there was a second part: the story-based theory. This part arose from discussing different hate stories. It describes other stories having different kinds of elements of the triangular theory. There is only one element present on some levels, like “*controller story*” and “*faceless foe.*” These have only the commitment element (see table 3) in some stories. Other stories can have two or three parts; for example, “*the stranger story*” is a combination of Intimacy and commitment, while “*the torturer story*” has all three elements in it. All these stories have suitable patterns and characters, like a love story. It also tells us whether hate is with individuals, objects, or groups that have stable roles with various characteristics (Sternberg, 2003).

Types	Description
Cool hate	Disgust (disgust of negation of intimacy alone)
Hot hate	Anger–fear (anger–fear of passion alone)
Cold hate	Devaluation–diminution (devaluation– diminution of decision–commitment alone)
Boiling hate	Revulsion (disgust of negation of intimacy _ anger–fear of passion)
Simmering hate	Loathing (disgust of negation of intimacy _ devaluation– diminution of decision–commitment)
Seething hate	Revilement (anger–fear of passion devaluation–diminution of decision–commitment)
Burning hate	Need for annihilation (disgust of negation of intimacy _ anger–fear of passion _ devaluation–diminution of decision–commitment)

Table 3. *Seven Types of Hate*

The dictionary definition of hate is “*to have strong dislike or sick will for; loathe; despise*” or “*to dislike or wish to avoid; shrink from*” (Neufeldt & Guralnik, 1997). Swan (2004) explained that hatred could come from living objects like humans or inanimate objects like mathematics. He describes students who hate mathematics because their teachers (living things) and mathematics are subjects (inanimate objects). Everyone has a story, and some stories relate to hatred; these stories may have different characters but sharing the same emotion. The story-based theory describes how hate arises and the pattern of hate through other hate stories. The hated enemy can be a murderer, pet, criminal, lust for power, greedy person, or control of one’s actions. On the other hand, it is also possible that the hated enemy is faceless and distinguished human characteristics, the enemy doing immoral things, it can be torture or the person’s role that makes one’s despicable. These stories that lead to hate feelings are an essential part of the duplex theory (Sternberg, 2003).

CHAPTER 3

Literature review

This chapter focuses on past literature which is related to the current research. This chapter focuses on many dimensions of “*mathematics*,” including its nature, pattern, teaching, and learning styles. This chapter explains people's negative attitudes and beliefs about mathematics and discusses various aspects of this challenging subject.

3.1 Mathematics

The subject of mathematics is beneficial in various disciplines such as medicine, social sciences, art and humanities, astronomy, management sciences, and many more. It is also compulsory and essential in many curricula to learn mathematics.

“*Mathematics can be tiring, but it opens opportunity doors*” is a comment by a pupil in research work by Pepin (2011) using triad of Zan and Martino (Fig. 3). Her comparison of Norwegian and English School students' “*attitude towards mathematics*” shows that pupils' perception about mathematics is mixed with positive and negative dimensions. They are investigating 194 English and 307 Norwegian pupils' thoughts about mathematics, many thoughts of mathematics as a “*non-creative*” and “*confusing subject*” (Pepin, 2011). Di Martino and Zan (2007) carried out a study in Italy collecting essays entitled “*Me and mathematics: my relationship with maths up to now*” from a thousand students across all grades. They found that the diagnoses of pupils' negative attitudes are the starting point for teachers to make different plans on how to teach in the classroom. Along with pupils' emotional disposition, they also say it is essential to know which type of self-efficacy beliefs and vision of mathematics pupils have.

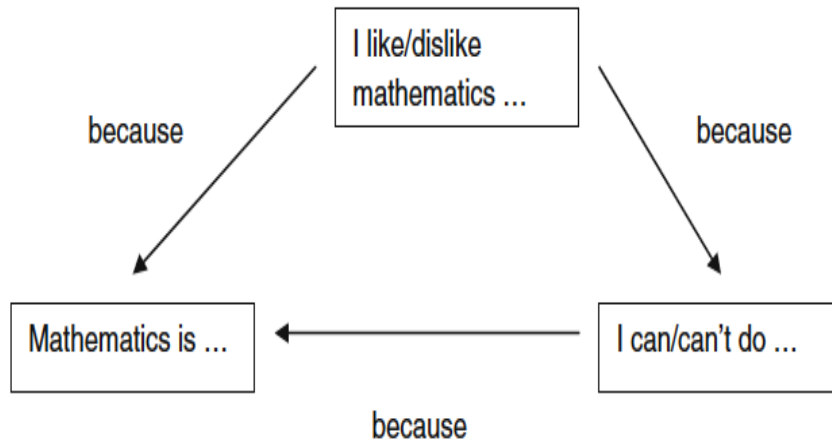


Figure 3. *Triad of Zan & Martino (2007)*

It seems that little has changed since the last century regarding students having an unpleasant picture and some even hating mathematics. It is observed that some people encourage others to avoid mathematics or look down on it (Swan, 2004). Boaler (2000) conducted a study on students' views about their school mathematics environments with the help of 76 students in 30-minute interviews. She concluded that *“monotony,” “lack of meaning,”* and *“the individual learner”* are major and dominant factors in traditional teaching that make mathematics uninteresting for them.

Chronaki and Kollosche (2019) presented a case study of a secondary student named Anja. Her rich narrative touches many topics regarding avoiding and despising mathematics and provides information to understand interconnections between her various experiences with mathematics. Figure 4 shows how a *“lack of togetherness,” “dignity,” “relevance,”* and *“bodily activity”* all play a role in her extremely negative beliefs and attitudes towards mathematics.

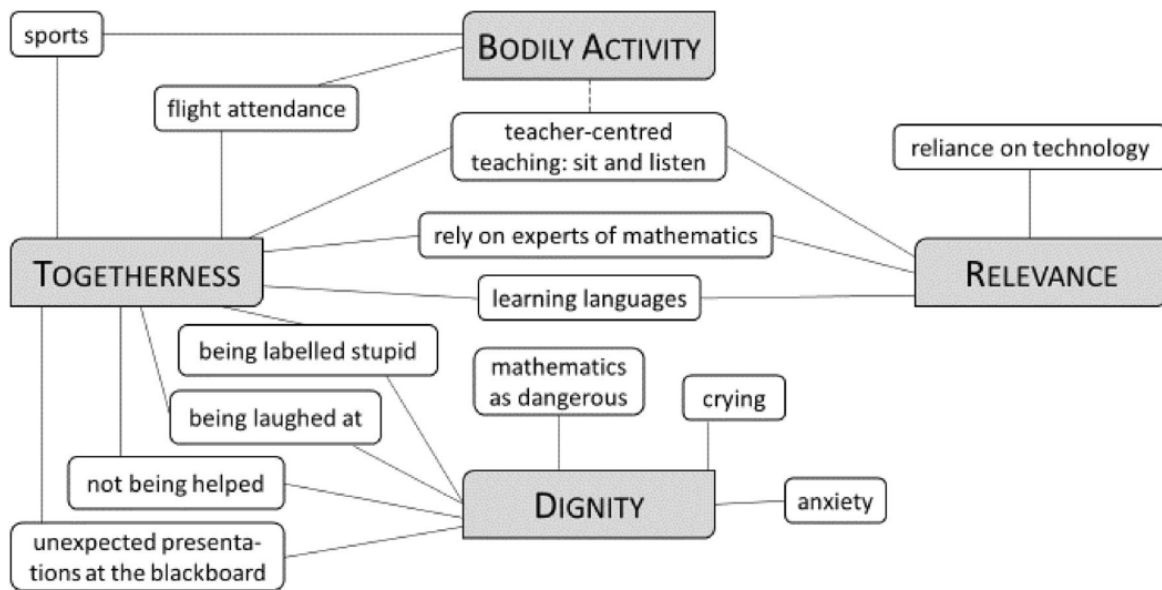


Figure 4. Result of a case study by Chronaki and Kollosche (2019)

3.1.1 Mathematics involves emotions

Andersson (2015) interviewed a student named Petra, who explained her feelings about a mathematician. She indicated that she hated mathematics, but she had to study it for her further studies. Larkin and Jorgensen (2015) looked at several students; one of them expressed, *“It sucks. And it sucks because it's hard and you have to do it every single day. (Year six student)”* (p. 938). Another student expressed, *“It's tough. It's tricky. I think maths is my hardest thing to do, and it's tough because when we do it, it's annoying and hard because I get most things wrong. (Year three student)”* (Larkin & Jorgensen, 2015, p. 938).

Chronaki and Kollosche (2019) presented a case study of Anja's secondary school student who explained her view about mathematics as a subject. The conclusion shows that mathematics as a subject hurt her emotions, badly affected her mental health, and made her feel alone in the classroom and being humiliated. Students' words about themselves when they cannot solve mathematical tasks indicate how they can feel terrible while learning mathematics. Grades 10 students said, *“I must say that sometimes I was rather good at some reasoning, but then as soon as I got things wrong, I convinced myself I was dull. I wouldn't like you to misunderstand the word I wrote, and I used to think I was obtuse, close-minded,*

and unable to understand and reason. Maybe I had made up in my mind a little image of mathematics, a subject I hate.” (Martino & Zan, 2013, p. 4).

3.1.2 The role of mathematics teaching

In Chronaki and Kolloosche’s (2019) case study of secondary level student Anja, she explained that mathematics assessments are rigorous as *“it is only right and wrong”* (p. 461), and there is so much pressure on students to achieve a passing mark. She indicates that the mathematics classroom is always teacher-centered, where the teacher stands in front of the class and all the students listen all the time. She explains that students have to go through a topic, go through exercises, and get homework for some practice, and after this work, the students move to the next issue. She would like to talk with other students, have group work, and discuss the learning problems, but all such activities are not allowed. So, after these activities, primarily, students are unable to apply mathematics in daily life (Chronaki & Kolloosche, 2019). When students get older, their academic work demands more effort, and they need more social support and encouragement. Students’ relation with teachers depends on their motivational level. Results show that motivation is related to student-teacher relationships and students lack motivation for their bad academic results (Skaalvik & Skaalvik, 2013).

Mathematical notions are important but looked weird. Tobias (1979, as cited in Hilton & Pedersen, 1980) discussed that students faced difficulties in the mastery of mathematics notions, understanding word problems, and how mathematics relates to the real world. Sometimes symbols and formulas make mathematics questions more complicated and complex, so the students cannot understand the pivot point of the question. Further, Tobias explained these points by considering fractions, calculus, negative numbers, and word problems.

3.1.3 Unpleasant experiences of mathematics

Unpleasant experiences in learning mathematics led students to develop negative beliefs and attitudes towards mathematics (Itter & Meyers, 2017). Negative beliefs and unpleasant experiences with mathematics play a role for avoiding of mathematics. Tobias (1990) interviewed hundreds of college students with math anxiety. She writes how folk- tales, fear, lack of opportunity and false impressions can cause a person to avoid mathematics. According to her, mathematics anxiety is due to unpleasant encounters with the surroundings

of mathematics, that society builds these perspectives and people pass these on to next generations. Negative attitudes and anxiety are related to assumptions and prejudices, such as “*girls couldn't do math*” or “*blacks don't become engineers*”, “*Someone would either be good with the number or with words*” but could not be good in both (Tobias, 1990).

3.1.4 Generic difficulties with mathematics as a subject

Larkin and Jorgensen (2016) collected data through self-recorded videos from 105 students over ten weeks using modern technology. Invited Students to sit in a tent within the classroom, which gave them a feeling of being private. Students of grades 3 and 6 used highly emotive language such as hatred, boredom, dislike, frustration, wanting to cry, feeling sick, and all these contexts show their negative attitude toward mathematics. According to the students, their negative feelings were the problematic nature of mathematics which generated feelings of hatred, anger, frustration, annoyance, and confusion among them. Almost 112 times, the word used 'hard' in connection to mathematics.

Students identified themselves as non-mathematical due to the challenging nature of this subject, in particular because they could not understand its concepts. Students' over-reliance on copying work down from the board and excess use of worksheets made the nature of mathematic complicated. A grade 6 student said that “*It sucks. And it sucks because it's hard and you have to do it every single day. Most people just have to do math all the time, and I don't like doing math all the time*” (p. 940). Sometimes the perception of hating mathematics is not hated. It is reported that some students have mixed feelings; that is, they like some elements of the subject but have anger towards some specific content of mathematics.

One student said that mathematics is mostly easy, but it is hard to do my times tables. So, they may relate the negative feelings to their “*content-specific difficulty with mathematics.*” Students became frustrated due to its challenging nature, trickiness, specific steps, and mathematical rules, leading to annoyance and confusion. Sometimes, they felt annoyed and frustrated when they were teased by their fellows who were good at mathematics (Larkin & Jorgensen, 2016).

3.1.5 No friend and having no fun

In the case study by Chronaki and Kollosche (2019) that I described earlier, a student was asked to compare her favorite subject ‘sport’ with mathematics. She unfolded many problems

regarding school mathematics as a lonely endeavor and its solitary activity. In sports, she had fun together with her friends, while in mathematics class, she had to solve problems alone. This student explained that students were not allowed to talk with their fellows for any help, and if she spoke with classmates or fellows, the learning would be good. Therefore, a mathematical classroom has no connection with togetherness and a joyful atmosphere (Chronaki & Kolloche, 2019).

Moreover, how the teacher treats his students as a student or as a person can affect learning. It is also excruciating that teachers rarely encouraged mathematical discussion, and the teacher did not allow them to talk within a class. Such an anti-social environment in which students cannot work together or even ask for help shows a weak relationship between a teacher and students and makes mathematics boring and unpleasant (Boaler, 2000).

3.1.6 Humiliation

A fear of looking stupid in front of the class can cause a negative experience and embarrassment. Being placed in the wrong math class can create a negative attitude, especially if the course was above a student's competency level. Doing mathematics tasks in class may put pressure and develop fear among students. A student shared her feelings when her math teacher called her to solve the problem on the board in front of the entire class. *"Sometimes I am sad because again I have not understood it. Also, I am a little anxious that the others will laugh at me because it was easy for them. Usually, that does not often happen, but still, you have that anxiety, that the others think you are stupid"* (p. 464). This helpless and anxious situation makes her afraid of mathematics. Such a humiliating activity relates mathematics with danger, although teacher's practice is accepted as legitimate. This blackboard practice puts much pressure on students as it has the power to label the students as 'stupid' (Chronaki & Kolloche, 2019).

Some terms used by those students who did not go as far as to state that they hate mathematics are frustration, irritation, annoyance, and confusion. Sometimes, they feel annoyed and frustrated when they were getting teased by their excellent fellows. They don't have a math brain and can't solve problems quickly or correctly; such remarks make students afraid and ashamed. Later these fears and disliking to mathematics gradually can turn into hatred (Swan, 2004).

3.1.7 Pointless mathematics

Yeo (2008) stated that math was challenging in many ways. Basic arithmetic skills are very multi-layered and must be taught in a sequential process. Children need to learn the foundation before trying to master skills and concepts. Then, mathematics became useless for them because students could not grasp these basic concepts. Lack of meaning, memorization of school mathematics' procedure and meaningless nature make it impractical (Boaler, 2000). In a case study of Anja, she consistently misses mathematics' relevance with daily life and is not essential to practice in future life. New technologies facilitate us with many gadgets that assist us in mathematics information and problem-solving. She was unable to understand why we have all that in our heads, having no meaning. It has no fun because she felt it has no relation with the natural world (Chronaki & Kolloosche, 2019). Teachers were also unable to provide proper guidelines in understanding the mathematics concepts and contact with the real world. When mathematics is learned in the classroom, has no connection, and is taught only the surface of a subject, such learning is not enough to encourage the student to mastery and understanding mathematics. Then, the learner's feelings of association cannot develop with the subject, and feelings of alienation and isolation grew (Itter & Meyers, 2017).

3.1.8 Remain still and listen

In the case study described earlier, Anja compares her favorite subject, sport, with mathematics. In sports, she says you are free to move; however, we all are bound to sit in class and listen to concentrate on mathematics. She was discouraged from engaging with other friends, and you have to sit at your seat focus on working with silence. To get the attention of the teacher you raise your finger is the most expressive activity. The other physical activity is a teacher's practice calling for presenting a problem on the board, which involves humiliating rather than excitement. (Chronak & Kolloosche, 2019).

Boaler (2000) used the word "monotony" for having no bodily activity, and this uniformity is the central negative point in traditional teaching. The feeling of sadness and boredom are reported, and the complaint of sickness and headache while doing mathematics. One student said that "*mathematics is complex for me because I don't like to use my brain because my head hurts. It gives me a massive headache, and it makes me feel sick* (p. 936). Overreliance on worksheets, copying from the board, lack of adequate instructions, repeating work while already knows the procedure are the reasons for boredom and sadness (Larkin & Jorgensen, 2016).

3.2 Math anxiety

Math's hate and math anxiety have been seen in young school children in the early elementary grades (Beilock, Gunderson, Ramirez, & Levine, 2010). However, negative attitudes towards mathematics and maths anxiety increase when children reach secondary school age, continuing into post-secondary education (Dowker, Sarkar, & Looi, 2016). Previous negative mathematical experiences have detrimental effects on students' attitudes regarding math performance and achievement (Beilock, 2008; Boaler, 2000). The individual student determines many negative mathematical experiences that I discussed earlier. Not coming to class prepared or ready to learn adds to how students develop poor attitudes towards mathematics. With this negativity, students enter the math classroom with hatred towards a subject that society has deemed necessary.

Boaler (2000) and Beilock (2008) suggested that math anxiety exists due to the method behind instruction and how students are tested. Traditional math classes focused on memorizing procedures and facts and provide little differentiation for individual needs. Math anxiety experienced in the classroom may also include a sub-facet related to the fear of math teachers. Other studies add the numerical tension content-related dimension to test and classroom math anxiety. It describes pressure when undertaking math operations and manipulating numbers (Ganley & McGraw, 2016).

3.3 Parent's role and child achievement

Parents play a crucial role in developing self-perception and are vital providers of self-efficacy and confidence in a child's life. Different people have different beliefs because their family environment, activity, and culture are different from others. Firstly, a child experiences with parents and influences his academic and professional lives then teachers and friends. In academic achievement, these beliefs work, and with experience, it becomes more vigorous. These beliefs can be changed later when one experiences opposite things in surrounding than their family environment (Schunk & Pajares, 2010).

According to Fotoples (2000), most negative thoughts develop from home because parents' parent's perception of math is not supportive or have a minor negative experience with mathematics. Children heard from the beginning about different negative things about this subject, such as math, which is challenging and not for everyone. Active contributing by parents to their child's education is essential, and Fotoples suggests that parents can

encourage their child to learn through "math night" in their family. In comparison, Furner and Berman (2003) Used "family math" for the same concept.

"Sum stress" is a term introduced by Fraser and Honeyford (2013), which means students suffer from stress while doing mathematical problems. Lack of confidence, parent pressure, bad experience, an unhealthy relationship with mathematics teachers are stress factors. Parent'sParent's feelings and expectations weighed the most and cannot be ignored (Swan, 2004).

3.4 Learning styles

According to Dunn (1984), a learning style is how each person engages with and retains information or skills regardless of how that process is described. She explained that learning style is how someone wants to learn. Some prefer a procedural way while others wish to perceptual. Moreover, she also said that a student could adapt to many styles, but one type is dominant. When mathematics is not taught in their learning style zone, then anxiety and fear may come. Combining different learning styles like written, verbal, visual, and kinesthetic may help them figure out which type works for them (Fotoples, 2000).

Hodge (1983) discussed how an unsuitable learning style could be responsible for math anxiety through three case studies. Students learn more when mathematics is taught in ways that meet their learning styles. For this, he discussed four primary factors: emotional, environmental, sociological, and physical. At the same time, Dunn (1984) developed one more type of learning: cognitive style. These five factors are called "stimuli" because they stimulate or inhibit learning and affect a person's ability and performance. All these elements do not affect everyone in the same way - it varies from person to person. Hodges (1983) discussed different cases regarding learning styles. In one case, Louie is a bright student, but he wants to take a short break during the class and reschedule the mathematics class's timing. In other instances, Janet wants to work in a small group, while Arthur is an unmotivated student whose math phobia can be reduced by connecting mathematics with the real world.

3.5 Mindset

Mindset is a collection of thoughts, beliefs, and feelings" perception of the world. People can change their ideas and attitude about their potential from a fixed mindset to a growth mindset or vice versa. An experimental study of "*massive, open, online course*" (MOOC) showed

students' mindset towards mathematics changed and increased performance (Boaler, Dieckmann, Pérez-Núñez, Sun, & Williams, 2018). Habberstad (2019) also showed that people have a change mindset and not a fixed mindset.

There is always different widespread myth about mathematics which usually people hold around us. Much dangerous myth ever circulated in society is that students are either born with the mathematics brain or not. If any student struggles with the subject, he always thinks, "*I am not a math person.*" I should be fast at learning mathematics, but I am not fast, so mathematic is not for me. Another is mathematics is all about memorization and procedure rather than concepts and creativity. Such beliefs lead them to dislike and sometimes toward hate. When students shifted from a fixed mindset to a growth mindset, their achievement increased (Boaler et al., 2018).

3.6 Self-efficacy and learning

Motivational beliefs are essential in learning; self-efficacy is one of them. Academic self-efficacy refers to students' ideas and attitudes toward their capabilities to achieve academic success and their belief and ability to fulfill academic tasks. Firm efficacy beliefs lead to an excellent performance by increasing commitment, struggle, and efforts (Pintrich, 2003). People with high or positive self-efficacy choose different and challenging tasks to explore the environment. Once they select a challenge, they try to show their best by remaining consistent and creating a new and favorable environment with patience (Schwarzer, Bäßler, Kwiatek, Schröder & Zhang, 1997).

In contrast, students with low or negative self-efficacy are more likely to be afraid of doing their tasks, avoiding, postponing, and giving up small efforts (Schunk & Ertmer, 2000). A person with low self-efficacy avoids facing new and challenging situations due to a lack of confidence in his ideas and efforts. Such a person doubts that he is not capable and can't control the situation (Schwarzer et al., 1997). A positive attitude and self-image essentially will help overcome the battle of math hate in the classroom. Therefore, high self-efficacy is one of the most critical factors in the students' academic success and learning. By adopting different teaching strategies, students' self-efficacy can be developed and enhanced to achieve the level of learning (Schunk & Ertmer, 2000).

After an extensive review of past studies regarding negative beliefs and attitudes towards mathematics, many dimensions and directions were identified, like different aspects of

mathematics, mindset, parents' role, math anxiety and self-efficacy, and learning. I cannot study all of them in one research work, so some have been selected for the current study on mathematics hate. These are anger, anxiety, frustration, humiliation, unpleasant experiences, and hatred. These dimensions help study mathematics hate in-depth and confine it. This chapter assisted me in finding constructs and concepts, which guided me in developing data collection tools, an interview protocol, and questionnaires.

CHAPTER 4

Methodology

This chapter discusses the various aspects of the research methodology used in the current study. It also covers research design, the population of the study, and the sample size for study and data collection methods. In addition, this chapter will discuss the reliability and validity of the instruments and different aspects of ethical consideration.

4.1 Research paradigm

This research work is based on an ontological position known as constructionist. The emphasis is on understanding the social issues through examining and interpreting these issues from the participants' or researcher's point of view. Its philosophical approach or epistemological position is interpretive. The current study will conclude this small sample; therefore, a strategy adopted for this work is inductive.

Research method for the Current Study

The term “*mixed methods*” refers to an emergent methodology of research that advances the systematic integration, or “*mixing*,” of quantitative and qualitative data within a single investigation of inquiry. Collecting and analyzing's both quantitative (closed-ended) and qualitative (open-ended) data. Mixed methods research is the type of research in which a researcher combines qualitative and quantitative research approaches for the general purposes of breadth and depth of understanding and confirmation (Schoonenboom & Johnson, 2017). In this mixed-method study, qualitative status is dominant.

Qualitative research mostly goes in-depth about an issue. Qualitative research is subjective and includes participants' views about a situation and topic and tries to capture the participant's feelings and ideas. Therefore, a qualitative research method is considered the best way to study things that this study cannot measure in numbers. We used a qualitative approach because it helps us understand the individuals' perception of the world (Bell & Waters 2014). It is also appropriate for qualitative where the sample is small but more affluent in the material.

4.2 Data collection

I collected my data in six case studies. I interpreted the data by giving meaning to what is said and felt at a specific time. Mostly such studies happen in natural settings, and researchers can interact with their participants. Techniques and procedures for data collection in case studies are mainly interviews, observation, and sometimes questionnaires (Bryman, 2016). In this qualitative case study data collected through interviews, conversations, and questionnaires. I tried to go in-depth on one issue that is feeling of hate towards mathematics.

Participants of the Study

Based on the previous study (Habberstad, 2019), I decided that interviews should be conducted with adults who have a hate for mathematics in their feelings, perception, and attitude. But due to pandemic situations, it was challenging to contacting different institutions to find such participants. My supervisor helped me find participants that was challenging for me in a new country and pandemic situation. In the current study, I included six participants. The six individuals were one male and five females, and I hadn't met any of them beforehand. All participants have high academic degrees and successful careers. In Group 1, three of them still have hate for mathematics even after finishing their studies. In Group 2, three participants have hatred for mathematics during their studies, but their animosity has dwindled. Pseudonyms are given to the students representing each respective group Ali, Anashe, Hajara (group 1) and Kristina, Laila, Karen (group 2).

How were the participant chosen?

With the help of my family, friends, and social media, I approached people who hate mathematics in this pandemic situation. I selected those who claimed their feelings were more substantial than dislike, calling it hate. For this, I talked to many people asking them some straightforward questions that helped me understand whether their feelings were close to dislike or hate. In the end, I selected those six participants who talked about their feelings in terms of contempt. Details of all participants are provided according to the ethics rules. All the interviews were conducted digitally through ZOOM, and the time slot was selected by the participants themselves when they are readily available in a comfortable environment. To participate in the research, firstly, every participant received information letter (appendix 1a) about the project and process. The data collection has started after receiving their consent.

Participants of group 1

All in Group 1 claimed that they do not have any doubt about their feelings of extreme hate for mathematics. Mathematics was always a challenging subject for them.

Participant 1 (Ali) is 25 years old and lives in Asia. He studies for his bachelor's degree in computer science. He is a very confident person having a great passion for becoming a cyber-security expert. Besides his studies, he also works with a software house as a web developer. Furthermore, he has a cheerful, talkative, and scientific-minded personality. But he hasn't had a good relationship with mathematics since his childhood.

Participant 2 (Anashe) is a 41-year-old housewife who lives in African continent with three children. Recently, she started her Ph.D. in peace and development studies. Her hate for mathematics is still growing because it gives her a tough time daily. She was a lecturer and worked in social research for three years. She also worked as a General Manager and enjoyed her job.

Participant 3 (Hajara) is 30 years old, got education from one of the Asian countries, and completed her MPhil in media studies. She is also a book author and researcher. She is currently working at the high post and continuing her career as psychology, philosophy, international relations, political science, and media researcher. She is also working as a freelancer and running her business successfully. She is talented and managed to get full marks in all other subjects, but she hardly ever gets passing marks in mathematics.

Participants of Group 2

All participants in this group say that they had feelings of hate in their school life but now realize that mathematics is not as bad as they thought.

Participant 4 (Kristina) is 20 years old, living in Norway, and going to high school to improve her average grades. She is fond of reading, and she indicates herself as a literature lover. She wants to continue her studies in the field of medicine. She excels in science and languages in the classroom but constantly challenges solving different mathematical

problems, even simple questions. She is a person who doesn't hesitate to participate in any activity.

Participant 5 (Laila) is 26 years old; she got her education from two different countries of the Middle East and came to Norway a few years ago. She studies for her bachelor's in biomedical science. She is an active motivational speaker on social media and likes to participate in welfare works. She hated mathematics in her early childhood, and later, she figured out it's not so horrible.

Participant 6 (Karen) is over 50 years old; she lives in Norway but comes originally from another European country. She has a master's in management and business administration, and IT studies. She worked as a teacher, a programmer, and an educational business offering teacher professional development in digital technology. She is a practical person and now has a high position in the public sector.

4.3 Instruments for the study

Schwandt, Lincoln and Guba (2007) introduce two primary criteria to make the qualitative data valid and reliable by using trustworthiness and authenticity in work. Triangulation is one aspect of reliability where we will collect the data through different sources and methods to answer the same question. *“Triangulation entails using more than one method or source of data in the study of social phenomena”* (Bryman, 2016, p 392). So, in the current study, data are collected in four different ways, which will make the finding of the study more extraordinary in confidence. All these methods are discussed in detail.

A. General self-efficacy scale

Self-efficacy is a personal perception of external social factors regarding abilities, strength to achieve a goal, and effort to uncover a problem, attitude, or performance in a particular situation (Grusec, 1994). Self-efficacy was initially defined by Bandura in 1982. The person thinking toward themselves is optimistic or pessimistic. It can be neutral but here, the self-efficacy into two dimensions: whether the participants have high/positive or low/negative self-efficacy regarding their daily life problems. Their perceptions about general abilities are measured using the *“General self-efficacy scale,”* developed by Schwarzer et al. (1997). It has ten items rated on a 4-point scale ranging from (1) *“Not at all true”* to (4) *“Exactly true.”* The scale is attached in the appendix 2c. This instrument is helpful for understanding

which type of self-perception participants has related to daily life, particularly handling routine problems.

The scores on this self-efficacy scale range between 10 (when a participant answered “1” on all items) and 40 (when a participant responded “4” on all items).

B. Math self-efficacy scale

Math self-efficacy is a person's self-efficacy but then regarding solving mathematical problems. Originally this scale was developed by Betz and Hackett (1983), but Ferla (2009) Math self-efficacy scale used in the current study; the guideline is also related to self-efficacy beliefs. In this instrument, eight items are rated on a 4-point scale ranging from (1) “*Very confident*” to (4) “*Not at all confident*” (Ferla, Valcke, & Cai, 2009). The scores of the participants on this mathematics self-efficacy scale range between 8 (when a participant answered “1” on all items) and 32 (when a participant answered “4” on all things).

This mathematics self-efficacy scale is helpful for understanding participants' perspectives about their perception in solving mathematics problems. Negative or low self-efficacy can be one cause of hating mathematics. Moreover, it is helpful to find reasons behind their mathematics hate. Suppose I can determine which type of perception the participants have; they can choose their motivation for hostility and intensity of hatred. Additionally, this instrument is helpful for understanding which kind of perception and attitude participants have related to mathematics. The math self-efficacy scale is attached in the appendix 2d.

To compare the two types of self-efficacy, I will reverse the scaling order of maths' self-efficacy scale. Initially, it is from (1) “*Very confident*” to (4) “*Not at all confident*,” But I will be presented it as (1) “*Not at all confident*” to (4) “*Very confident*.”

C. Semi-structured interview

This research work is a qualitative case study, and for this, primary data is collected through interviews. The interview is conducted with two groups: G1 (still hate mathematics) and G2 (hate the subject at the time of studying), with 3 participants in each group. One Informal meeting is conducted where participants give some information about themselves. According to Bell (2014), sometimes participants do not provide essential information, for this researcher must prepare themselves to get the desired information related to your research work. For a fruitful interview, arranged the interview appropriately with necessary items placed in a sequence. It also helps me remain on track and remind me about my task to hit the

desirable information. Habberstad (2019) interview guide hates for mathematics are used with some changes relating to my work. The interview guide is attached in the appendix 2b.

D. Rempel list for hate

Different people have different words, feelings, thoughts, and actions to express their hatred. Some people use harsh words and show severe activities to express their hatred, while others only express their disgust. The intensity of hate in expressing emotions and actions varies from person to person and society to society. A general list of hate by Rempel (2019) consists of 52 statements having different activities, thoughts, and feelings towards the target. This list of hate is used at the end of the interview where the participants have to choose the right words for their hate from the list and which is close and can interpret their feelings of hatred in a better way. These statements are helpful to generalize significant findings of the study whether participants have shared thoughts and feelings. The list of Rempel statements for hate is attached in the appendix 2e; item number 30 will not be used in this study.

4.4 Choice of method

The interview describes the in-depth conversation between two or more persons where the researcher tries to gain the information about a specific problem by discussing different aspects. Due to its adaptability, where researcher can investigate motives, feelings, and responses in better ways. How a reply is made (the tone of voice, facial expression, hesitation, and so on) can provide information hidden by a written response. Interviews are rich with information and can often put flesh on the bones of the questionnaire responses (Bell, et al.,2014). Thus, in such a case study, interviews are the best method for data collection to understand someone's psychology and feelings. The interview offers knowledge regarding various contexts that may provide new directions for more research.

A questionnaire collects the secondary data. It has three subparts: general self-efficacy scale, list of hate, and math's self-efficacy scale, which supports my findings to achieve the natural causes. Confidence, self-concept, self-efficacy, effort, and ability attributions are essential and related concepts in learning and teaching mathematics (McLeod, 2005). Therefore, two self-efficacy scales will be used. Firstly, the Bandura general self-efficacy scales were utilized before the semi-structured interview started. Participants gave the answers to statements by choosing the suitable option according to their capabilities. Self-efficacy does

not represent one's ability to achieve a task and effort; it's about one belief. This self-efficacy is helpful to understand that those people who hate math (G1) or have a problem with math learning (G2). Do these people have low or high beliefs while solving problems in their daily lives, and at what level are they put effort to solve a task.

Furthermore, this work is related to the mathematics subjects' negative feelings and attitudes. Using a PISA questionnaire to check how much they're confident about solving mathematics problems is helpful. Participants have to fill the mathematics self-efficacy scale at the end of the session. Both instruments' results compare whether their mathematics and general self-efficacy are the same levels or different.

In the third step, used an instrument, that is, the Rempel list of 52 statements for hates. Where participants choose words that can accurately describe their feelings and acts of hates. The results are helpful to know the common factors of contempt for the participants and make it easy to generalize the participants of hatred toward mathematics.

4.5 Preparing for data collection

After selecting instruments and designing interview questions, prepared lists of all the steps and procedures in a well-mannered way and tested them through a pilot study.

Interview protocol

“Interview protocols become not only a set of questions but also a procedural guide for directing a new qualitative researcher through the interview process.” To all the more likely comprehends to get the proper and detailed explanations behind their negativity toward mathematics, an interview protocol developed properly describes the whole data collection procedure. In the current study, an interview protocol is used.

Pilot study

A pilot study is preliminary; therefore, a well-designed and well-conducted pilot study helps find the research's hidden error. The term pilot study refers to mini versions of the full-scale investigation, sometimes called feasibility. It is a crucial element of a good study design for pretesting interview schedules and scales (Van.T & Hundley, 2001). Therefore, before conducting large-scale research, it is good to check all instruments and research questions by conducting a pilot study to determine how well your tools work. The current research also

showed a pilot study for removing shortcomings which are helpful to modify scales and interview questions. This pilot study provides me with an excellent chance to test my instruments and which types of flaws my interview protocol has. It also allowed me to record the time interval in taking interviews and familiarization myself with the tools. Overall, the pilot study provided me with the confidence to handle tools and conduct interviews more appropriately.

4.6 Plan for data analysis

There is no straightforward way to analyze the qualitative data as it is unstructured textual material (Bryman, 2016). After conducting the interview and collecting participants, data is presented in tables and interpretation of results. The detail of data analysis is provided in the table 4 given below.

Social, cultural theory	<ul style="list-style-type: none"> • This category is about statements that mention fellow human beings such as parents, friends, teachers, and the classroom environment. The category also addresses other social factors that may have an impact on the individual's hatred. This can be, for example, grades, tests, mathematics books, activities etc.
Affective domain	<ul style="list-style-type: none"> • This category is about what types of belief participants have. <ul style="list-style-type: none"> • About their own self • About mathematics • I will also discuss their attitude, like how they behaved when they did not fulfill mathematics tasks. • Feelings and emotions will be under discussion. Participants can also talk about their feelings' other than hate in the interview. These feelings can be anything from joy to anger.
Explanation of hate	<ul style="list-style-type: none"> • This category is about a more concrete deepening of the hate participants hold. Rempel's statements about hate, how hatred is experienced, and why the resurrection is presented in this category.
Duplex theory of hate	<ul style="list-style-type: none"> • This category involved which type of hate participant have, according to Sternberg defined types of hate. A triangle of hate will be a draw after investigating which component is dominant in their hatred.
Self-efficacy	<ul style="list-style-type: none"> • General self-efficacy and mathematics self-efficacy will be measure and compare in this section. Whether participants have the same level on both scales and at a different level. It will also include, whether general self-efficacy has any affects in learning mathematics or not.

Table 4. *Plan for data Analysis*

4.7 Reliability and validity of data

Reliability and validity are essential in any research. So, in the current study, both the reliability and validity of all instruments are also checked. Fairness, ontological authenticity, educative authenticity, catalytic authenticity, and tactical authenticity are criteria for qualitative research (Schwandt, Lincoln, & Guba, 2007). All these criteria are concerned with a broader set of issues and help find the four basic questions: truth value, applicability, consistency, and neutrality in research.

Credibility: Triangulation, member check, prolonged engagement, peer debriefing, and persistent observation are essential factors to establish credibility. It is more related to internal validity. Triangulation or cross-checking the data by asking the same question from different participants, collecting data from various sources, and using other methods to answer the same problem.

Member check is informal testing the data, when interpreted data, which collects through interviews and asks the respondents to review what they told. To make my data more reliable, I asked my participants to check what I had transcribed and its helped. Participants like member checks because it gives them a chance to verify their statements and fill the gaps. To make your research work better, ask the professional peer to inquire and assist in developing work (Schwandt, et al., 2007).

Transferability: The researcher should provide a detailed description of study sites, participants, and procedures of data collection. Other researchers who may like to extend results somewhere may quickly access the generalization of matches (Schwandt, et al., 2007). In this research work, all four instruments, transcripts of the interviews, sources of study sites, and participants' details have be provided to make it valid.

Dependability: These criteria of trustworthiness parallel to reliability in quantitative research. Schwandt, Lincoln, and Guba (2007) propose dependability. It requires the factor of accuracy, and an auditing methodology should be followed. Where colleagues and others inquiry serve as auditors (Bryman, 2016). To make it more reliable, data has be collected in four different ways. All these methods for data collection reduce the possibility of errors and help to generalize my findings somehow.

Conformability: The whole process of data collection and interpretation should be clear from the researcher's biases and assumptions. According to Bryman (2016), the researcher should have honesty and result should be free from the influence of the researcher. This is a qualitative study where mostly data were collected through narrative, which depends on the participant's past and present experience and emotions. Everyone has their point of view to observing and describing things and situations. They also react differently by experiencing different emotions in the same problem. I tried that interpretation should not be based on my preferences and points of view.

4.8 Ethical considerations

Many organizations have their ethical research guidelines, research contracts, code of practice, and protocols, including many issues like confidentiality, anonymity, and safety (Bell & Waters 2014). For good research, it is necessary to follow the institute's rules we are working on, so this work also conducted according to university rules and regulations. I examined their guideline throughout the investigation. I took permission from NSD (Norwegian Center for Research Data) that is attached in appendix 1b.

Followings are the ethical considerations also followed in current research.

- No harm to participants.
- Informed consent, invasion of privacy
- Follow the integrity, responsibility, transparency, and respect to participants.
- Permission for audio recording in the semi-structured interviews
- Great care about the identity of the participants.
- No psychological stress, anxiety, or humiliation.

In this research, all participants are educated and fully aware of their purpose and assured would use their answers only for educational ends. All participants are volunteers and are free to withdraw at any stage for whatever reason will be.

Interviews are time-consuming, it is a highly subjective technique, and therefore there is always the danger of bias. *“The researcher is also a human being and not machine, and their manner can affect the respondents”* (Bell & Waters 2014). A qualitative research strategy where researchers have to see things from the participant's perspective cannot be value-free. Such research is bound up with the subjectively of the practitioners (Bryman, 2016). In this

research, where feelings and emotions are involved, I tried these findings, free from biases and have not affected by my knowledge and experiences. Only participants' points of view have been discussed and elaborated.

CHAPTER 5

Results and analysis

Analysis of data that presents in this chapter, involves participant responses to social environment, affective domain and their emotions working with mathematics. This chapter consists of two sections where the first section presents the interviews' analysis that analyzed according to the coding material presented in chapter 4. Second part presents analysis of the scales according to the participant's perceptions. The results from his study cannot be generalized but are only meant to be suggestive and any conclusions drawn are tentative.

A. Analysis of qualitative part

Group 1

5.1 Ali

Throughout the interview, he has tough expression and hesitating to share his experiences. To get education he used to live in boarding school and belongs to an Asian country. He tried to give short and relevant answers. In our second conversation, he shared some more things from his past with few details, which I asked. He has completed his degree and before starting his own software house he is working with different projects with foreign company to get experience.

5.1.1 The social aspects

a. School environment

Talking about school and classroom environment, he satisfied. Ali's classmate was on the same level, but he thinks that his classmates didn't help him properly. He always has to compete and in competition with the boy who always got 1st position.

Ali: Classroom was also Normal. But sometimes, few boys and girls become selfish in greediness to get 1st position, so they were not helping.

Regarding his teachers, he is not happy with mathematics teachers. He doesn't like him, but he didn't mention openly hate for mathematics teachers. Although he humiliated and punished many times by mathematics teacher, he didn't use harsh words.

Ali: No, I do not hate my teacher. I disappointed a bit by them. The teacher at my school was not so good with me.

Many times, he punished by his math's teachers, but he doesn't show any expressions while talking on this. When I asked his teacher response if he is not performing well. His replied was simple but full of pain. All they could do with him to beat, scold or angry with him. All these things happened in front of girls that were more painful for him.

Ali: In the time of often school, I have beaten every day in math class. The math teacher always made me "murgha" (This is the stress position used for punishment and is common in Asia. In this punishment person has to Squat and loop the arms behind the knees to grip the ears).

b. Family

Regarding his family performance in mathematics, his reply was straightforward, and his expression shows that he doesn't like to talk on this topic.

Ali: I just say about my family. Our whole family is against of mathematics the hate is given us in inheritance for math, nothing else.

He also joined for extra classes outside the school, but it didn't work in his case. Math is not issuing with him only, but it created a problem for all of his siblings, so no one helps him come out.

Ali: I tried a lot I started go to the academy I practiced in my home. I tried a lot, so the result was not much appreciated.

5.1.2 Affects

a. Attitude and beliefs toward mathematics

Ali perception about mathematics was not positive. When asked by him which part of mathematics, he found difficult, he said,

Ali: Excuse me! Just ask me where I am not facing the problem, mathematics itself is a problem to me. The word "PROBLEM" that exists in mathematics is to "problem questions".

He always feels uncomfortable while doing mathematics and wants to kill the person who introduces mathematics to the world.

Ali: Totally uncomfortable I wish this person died earlier while he was inventing/discovering mathematics whatever. I don't want to abuse him; I think that's enough.

b. Perception about own self

He has more concerned about what people will think about him when he does not do well. So, he always degrades himself to perform in the mathematics classroom.

Ali: I think what people will think about me if I didn't solve out the problems because I don't know even the Minus (negative) plus (addition) of mathematics, so I never tried even never thought of it to raise the hand. I am not that much stupid to raise a hand and insult myself.

He was good in all other subjects, but this is the only subject he is struggling with. The reason he has that his base doesn't develop well. Therefore, when he was unable to solve mathematics task he blamed and underestimate himself.

Ali: As I mentioned above, I have anger with mathematics as well as disappointment. I curse myself I started degrading myself at that time. I start blubbering with myself that I am so dumb that I cannot solve the mathematics task what I will do in the future? What I will do else if I can't do that much.

5.1.3 Emotions

Sharing his emotions while working with mathematics, he said that he was not able to do any other work.

Ali: While working on a mathematics task I get a fever of 104.

Further expressing his hate, he said he is angry with mathematics because he was teasing and abusing himself due to mathematics.

Ali: I have teased my whole life by mathematics, so when someone speaks the name of mathematics in front of me, I get a headache at that moment on the spot. So, I am angry with mathematics.

a. How hatred developed

Regarding his dislike, he was very clear and obvious when these negative feelings have developed to him. He shared an incident that shows teachers behavior and special attention for few students in the mathematics class cause disturbing him. His mathematics teacher used to strictly mark his papers in the exam than the 1st position holder.

Ali: I think it was in class 6th in which I realized. There is a little story behind it which I can't tell right now. The conversation will be gone so long. So yeah, this was class 6th.

Because of his bad experience from previous mathematics class. He also shared one of his painful days while he was struggling with mathematics. Once he is the only boy who got a bad grade in the class, this thing disturbed him a lot that he spent the night on the road crying and teasing oneself. In his opinion the problem with mathematics he has it is his teacher who didn't make his base properly. He said he was capable of understand mathematics, and he blamed his teachers.

Ali: Yeah, in my opinion, it is something like that because the teacher makes their students' base, not students on their own. Maybe, due to teachers, I am not good at it. Otherwise, I am very capable.

b. Duplex theory of hate

Although he was not getting his desire outcome according to his inputs, he didn't give up. He is such a person who tried to overcome his negative thoughts and feelings and motivated to meet his goals in life. But sometimes, he cannot control himself and speak nonsense.

Ali: I worked on it but no changes. Once I get angry, I can't control myself, I spit out whatever comes out of my mouth.

When I asked to him about the mathematics teachers who humiliated and punished him many ways, he replied with a smile that he was not such a bad student to kill them, but he abused his mathematics teachers in his mind. To his hate for mathematics, neither he blamed mathematics nor himself or any other person but the person who introduces mathematics.

Ali: if I get a chance, I will undo the person who invents the mathematics that he could never invent again.

In his point of view mathematics language is a language of alien, and he has unhappy relation with it. He was also struggling with mathematics in his bachelor, and he is happy that he successfully completed his degree. He has planned for further study and expecting mathematics as well.

Ali: As I don't have a reliable source death would never leave your back. So that kind of situation is with math. I still have mathematics in my life. Math does not want to leave my back; it has a strong bond with me.

In his point of view the people who can understand mathematics have supernatural powers otherwise it's not a human brain would not be able to understand and write such mathematic terms and concepts.

Ali: Of course, this totally different subject. The other subjects have written in human language, and this is the only subject which I think written by Jinn. The People who understand mathematics are just like Jinn type.

5.1.4 Why still hate mathematics

When it came to changing perceptions, he replied with powerful remarks, which demonstrate he has a high level of mathematical hatred. He does not consider that a relationship with mathematics needs to be reconstructed. He doesn't like this, hate it, it's not acceptable, and no need to change thoughts. Furthermore, he also mentioned that he has painful moments in his life that he doesn't want to remember.

Ali: Not math is not my wife that someone will jump into our relationship and try to fix everything. I am not always talking about mathematics hate whenever I face mathematics hate. So, I just tell you that much that I am weak at math that's it, but I really hate it.

In his school life he tried to change his mindset, after trying and encouraging own self, he gave up. His attitude shows he has no concern with mathematics because it is out of his range. After putting so many efforts he doesn't want to try more.

Ali: Yes, I tried many times and worked on it so hard, but the thing I get as a result only was a disappointment. The scene between math and me is just like that “two of a trade seldom agree.”

5.2 Anashe

This is the first time she shared her feelings openly, before that, she was feeling alone that she is struggling with mathematics. She was glad that someone shared her feelings and people like her also exist in the world. She completed her education from Africa and persuading her PhD. Throughout the interviewing, it is clearly seen from her facial expression that how much she was frustrated and uneasy talking about mathematics.

5.2.1 The Social aspects

a. School environment

Every time she appreciated with cause to knowing her teachers that they did a good job. It is not the teachers' fault if they are teaching with too many students in the same class. They can't pay attention to all the students, especially those who are doing well in other subjects.

Anashe: First, there was nothing wrong with my teachers. I really appreciated what they did. I have taught before, and I know when a student is struggling. You have a class with different students on different levels. You have to try to move them all along.

In her O level, she didn't get the desired grade in mathematics and had to repeat it. Despite putting too much effort, she didn't get high marks in mathematics. Somehow, she managed to get the desired grade to enter the university. When it comes to her friends and classmates, she was omitting afraid of her fellows' comments. Therefore, she just shared some facts with them and never asked for help.

Anashe: I didn't share my feelings with my friends. I just discussed the facts that it is difficult for me. People start giving their arguments and ideas, and they just encouraged me. I just follow them, but I don't find it funny and can't make and enjoy jokes.

b. Family

Anashe's mother didn't continue her education, although she was good at mathematics. She was a busy housewife, but she has good mathematics skills. Her father used to teach them basic math, but later he didn't have the time to teach. Her elder brother doesn't like mathematics, so he drops it. She considered herself at the lowest level of all her siblings because she even didn't have basic math knowledge.

Anashe: They were average and even understood mathematics. I am the worst in the package. They have a better understanding.

She is feeling alone that she is struggling with mathematics because she was the only one struggling with it in her school life. Now her family is also good in it, and still, she feels she is the person who is bad in it.

Anashe: My son my kids are very good at mathematics. My man is also very good, so when we are sitting at a table, I am the only one who is clueless. Can you imagine how it feels, when everybody is discussing and laughing, I even don't know? They are putting jokes on mathematics, and I am sitting there and losing out.

5.2.2 Affects

a. Attitude and beliefs toward mathematics

Mathematics is a phobia for her, and she is always looking for excuses to get rid of it. She reassures herself that I don't need it in my life. Even though she doesn't like to counter with mathematics, she doesn't deny its importance.

Anashe: It has gone that I struggled with hard, and I feel a fear for mathematics. When I see any digit, it is like a phobia with me where my heart bet fast. I just go blank, and I said myself, okay, I can live without numbers. I can manage to do shop that's what I need. I put numbers aside and can live without it, but I don't like it at the back of my mind.

Earlier mathematics was not so important in few fields of life, but now they have given so much value to this subject those people are forcing to learning it before entering a professional job. She does not like to involve mathematics in every field of life and cannot understand why it taught in every course.

Anashe: You have to do core math even though you are not good, but you are supposed to do it now. To get admission at any college, you need five compulsory subjects English, math and three other subjects. These are the compulsory subjects you must depend on these you want to do further. If you need to go geography, nursing, or Biology, math is compulsory, and I don't like it.

b. Perception about own self

She thought her base was not developed properly, therefore, she has regret if she asks for extra help from her teacher maybe she will come on the same level as others in the class and the situation will be brought out now. Here once again she wants to say some harsh words for mathematics, but she stopped her from doing so. She just wants to get rid of it and don't want to see mathematics in her life.

Anashe: Yes, I always feel that mathematics is not for me, and I am stupid and cannot do mathematics. As I said that I don't have any kind words for mathematics. Math is for me like an AHH, I should brush it off from my life. I can give you any excuse not to do it.

Being a confident and intelligent person, she always tried to join mathematics. She wanted to study and understand it, but mathematics is not allowing her to enter his life. She did not accuse anyone, not even herself, for all this. She argued that her mind was now unable to grasp these math's.

Anashe: I was frustrated and feel that I wasn't for mathematics at that time. I was also frustrated that I can't get it and people around me were getting it. Why all of my friends are getting it, but I can't. I have always been full of confidence, and nothing could drown me. Though I was trying to drown in its. It says no, I am not for math, and I don't have a problem.

5.2.3 Emotions

She tried to put her feelings into words. She introduced the word "blocked" that expression she used to describe her frustration, anger, and helplessness for this subject that stopped her to understand. On a question about how she feels about mathematics now. She said it's like a phobia and define it's as she became frustrated, and all the feelings of self-loathing became alive.

Anashe: I often called it "Phobia". I define my phobia as, the moment I see any paper with numbers and problems – I completely shut it and put it aside. I even don't want to look at it a second time. I even don't try to know what these numbers are saying. The moment I try to look at it, all the emotions come across. That I don't know it, I cannot understand and solve it, and it's not for me. So, I put it aside.

She has a soft heart and good training that she doesn't want to utter any harsh words for mathematics expects hate although she wants to say much more. Wherever mathematics came into her life, everything became jam, and she can't move forward without any help. She likened the mathematics subject to a man and said,

Anashe: I really don't need this guy. If math is a person, I don't need that person in my life. It's a bad speed bump and don't need it.

a. How hatred developed

In grade 5, she realized that mathematics is not for her. After failed struggled in mathematics. It's neither the problem with her nor with the mathematics. She gave a reason that where she found the problem was. Unpleasant learning styles are one of the reasons from where her struggle with mathematics started. She felt alone herself to struggling with this subject, while the surrounding people understood and made laughed with mathematics. Explicitly she doesn't say that this thing hurts her.

Anashe: It's the first time I'm discussing my emotions but in math, I don't know what to add. Discussing my emotions eventually, I thought I was the only person with the math problem in the world because everybody around me understands at all and I was alone with my feelings.

b. Duplex theory of hate

She didn't use any strange words for mathematics she resembles mathematics with a person to explain her feelings. Neither from school nor home, she didn't hear bad words for mathematics. In her opinion, it's the nature of math that people struggled with it.

Anashe: No, it's not from my surroundings. It's my personal experience. I struggle to learn mathematics. I haven't heard anything bad about math in my surroundings; it's a good subject, but many people are affected/hindered by its difficulty.

She doesn't want to kill or destroy the mathematics; she just wants to avoid it and don't want to see it in her life. Having a polite nature, she will forgive mathematics but don't want to see it.

Anashe: For me, it's a success that I can't do it and didn't understand. I don't know the things I misbehaved; I never throw tantrums.

She hated mathematics but was never allowed to be expressing this hate in words and actions. She didn't say that much to share her feelings, but she wanted to say a lot about it is deep down.

Anashe: I never felt embarrassed but frustrated, angry, and eventually, it comes into fear and anger. I was afraid of being failed; I was trying very hard and still get the wrong answers. How can I get the right answers with the wrong formula? I was not good at graph work, in the exam when everybody around me asked for graph paper, and I have no idea what to do with this paper. I went into a panic mood. I didn't ask for the graph paper, so you could imagine I feared that I would fail. Then exams results come out, and it was a headache. Now this fear has gone to become a phobia, fear for numbers. Phobia of numbers, I district my day, it could be a bright day but became gloomy.

5.2.4 Why still hate mathematics

She has a kind nature and due to her kind nature, she wanted to forgive mathematics and would try in her life to learn mathematics. But she always discourages herself and her kids to use the word of hate although she has very strong emotions for mathematics in her heart.

Anashe: I don't use hate words too much in my life, and I discourage my kids from using this. It is very strong. It is also because you have to give room to forgiveness, they have to forgive. Therefore, I said to forgive maths, although I hate it. Now I don't have a relationship with maths like before, so I forgive maths.

Her mindset developed so that unpleasant feelings arise when she saw anything involving numbers. Those feelings were so intense that she didn't really want to know if they were easy or complicated. What she tried to do was push it away from her eyes. She spends every day of her life with regret because mathematics is including in everything and influencing her life. Particularly when she is struggling to teaches her children basic mathematics. But she doesn't combine what to do and how she can get out of these unpleasant emotions.

Anashe: I am suffering from homeschooling now. I have to teach my daughter and wait for my husband to teach her math when he comes from work. Otherwise, we will kill each other because I don't know what's happening there (math work).

5.3 Hajara

She works in such fields where she communicates with many people on a regular basis, showing she has good communication skills. Being a researcher and book writer, she has high aims and goals, and she is successfully achieving her goals. She is an extra intelligent and confident person. Therefore, not only she likes to take part in this study, but she enjoyed the interview. She is fond of music, artistic and creative things.

5.3.1 The Social aspects

a. School environment

Her mathematics' teachers were good and when she was not performing well in mathematics class, her teacher's reaction was indifferent. Only one time, she got punishment from her mathematics teacher to obtain bad grades. Hajara showed no expressions on this punishment, but she remembered very well even the date and time. After this incident, she tried to avoid mathematics.

Hajara: I scored 2/10. At least I have scored two, but my teacher asked nothing. She took my hands and snatched the wooden duster. The teacher said I would hit you ten times. I said, Okay, I don't care; it's just punishment, do whatever you want. This was the first and the last I got punishment as a mathematics student. Later I always tried to avoid opting for mathematics, not even statistics.

Regarding the behavior of her friends and class fellows, she replied to some of her friends got good marks in mathematics, but they didn't compete with her in other subjects. She covered her bad marks in mathematics with other subjects and gains a position.

Hajara: I am the kind of person who was scoring 95/100, 96/100 in every subject except mathematics. This is the only subject that affects the overall performance that frustrated me sometimes. While I was comparing myself with other students, they were availing marks 75 or 76. Performing poor in mathematics was not actually adversity effect on my result and position. It didn't affect me at all, so I don't bother myself.

b. Family

She claimed her family has a high IQ. While she was talking about her family, she also included her relatives that are also good at it. In her family, mathematics is difficult for her mother, but she never uses negative words for it.

Hajara: My mother is poor in mathematics, and she is the only person of my kind in the whole family who says mathematics is difficult and sometimes we cannot understand it. The compulsion to study it and increase confusion and frustration were the two things responsible for my hatred toward mathematics. I hate mathematics to the moon and back.

Being the youngest child in her family she got extra care and attention and did whatever she wanted. She wanted to get full marks in it for this once she asked her mother for an extra class for mathematics. Her mother encouraged her that she can manage herself.

Hajara: Once I asked my mother what I needed, she said that you scored higher marks in other subjects. You have to do it your own you don't need any tuition and can manage. Maybe, she is a mediator making my mind toward psychology. Being a brilliant student, I didn't take extra classes, never.

5.3.2 Affects

a. Attitude and beliefs toward mathematics

For her, mathematics is necessary, and you must solve its problems to get marks. Algebra and geometry were most problematic for her and after investing too much energy in it she decided she was not for mathematics. She was encouraged to teaching mathematics in class but not complex. Due to its complexity, mathematics name is enough to change her mood expressions.

Hajara: It's a face bump, no way because I know I have another option. Even thinking about the subject of math is enough to change my mood.

b. Perception about own self

The answers to too many questions ended with that she was a brilliant student with a High IQ level, so she doesn't care about mathematics. She is always relaxing by saying she doesn't care. She has another field. In her university test, she intentionally leaves mathematics parts

because she knows she scored full in others. She didn't underestimate herself for not getting bad grades in it. Therefore, she convinced herself an earlier age that she is not for mathematics. In her opinion, it is not understandable for everyone, and I know I am not made for mathematics.

Hajara: My family's IQ level is measure in a normal environment and it's high. If you ask them to build a building, they follow the exact pattern. When asking me, I will not follow the pattern. They will do what they have shown, and I will do what I want. You can call it creativity, but this is the primary difference between them and me. I never felt guilty within myself when I got bad grades; I am very good in others. I was bad at it and I just passed it by cramming. I don't know how I passed it.

5.3.3 Emotions

Whenever she solved mathematics problems, she excited but if she can't she doesn't care for it. Sometimes, she was afraid of failing in mathematics subject this thing frustrated her that if she doesn't want to study it why it is compulsory.

Hajara: In the beginning, I don't have hard feelings for mathematics. Fear of failing and frustration I had, and this frustration and fear increased day by day, later changed into hate. In fact, I have more disappointment and frustration and not fear.

After putting in her efforts, she gave up and realized that mathematics is not for her. Her anger and frustration changed into disappointment then eventually into hate. Further, she explained that it is common if things create trouble for us and we cannot avoid it we have to study it without interest. It leads us to negative emotions and feelings.

Hajara: We have criteria when you grow up and start considering the factors in your surroundings. We start hating the things that don't match with us, and trouble ourselves and the others. Mathematics is one thing that is creating unease for me, so I hate mathematics. If it creates unease for others, then I don't care.

a. How hatred developed

She claimed that she was never interested in mathematics or perhaps because she has been another kind of student who used to be more interested in social issues. She didn't relate any bad incident with the hate of mathematics. It's her unanswered questions that how we relate

mathematics with life that leads her to developed negative feelings. She needs logic and usefulness for doing mathematics.

Hajara: I couldn't find any reason to solve an equation and answer my one question "why to"? Why solve an equation and then "How"? How to come 2nd and why to come 1st? I can never understand "how and why to solve an equation?"

In her school life, she was a brilliant student and want an explanation for where we use this mathematics and how and why? She shared an incident that showed her attitude and behavior towards mathematics, and she also came to know about her feelings.

Hajara: I remember it was a surprising board test and nobody performs well the teacher was shouting and shouting. I don't know how but I memorized the process I just held the chalk, wrote the answer, throw the chalk away, I knew it was right and moved back to my seat. In 5th grade of learning, I faced confusion and it irritated me, and I started to think why and how. I guess the shouting teacher didn't solve questions in my mind but created why.

b. Duplex theory of hate

Hajara mentioned many times that she hates mathematics. Whenever she tried to ask about her negative feelings or emotions, she doesn't care. She used not to overthink things that tease her, and she leaves the things by saying, "I don't care". She shared one of her reactions that she did when she frustrates.

Hajara: I felt angry; I took my book and smashed it on the wall. I don't care. Sometimes, I feel angry or irritated; I am more like an indifferent person. I don't care, "Go to Hell". I don't care is including anger, disappointment, and frustration. With time, I take tests for granted because I know I cannot solve them.

She just wanted to remove mathematics from her life. She didn't think too much about this because she was thankful to God for sending a person who invented mathematics software which makes mathematics and her research work easier.

Hajara: I just want to remove it from my life, and I did it. For others, I don't care.

When a question came have, she heard good or bad in her surroundings she said this hate came itself with her struggle and unanswered questions. She also wondered why this subject irritates her so much.

Hajara: It came by itself. It came from anger, frustration and consistently trying to solve the problems and being unable to solve the questions. I got irritated and I didn't care. I often wanted to find out why it frustrated me so much that I hate this but believe me I have this. But I don't think so much and don't care.

5.3.4 Why still hate mathematics

Her teachers, parents' even friends are using to say that just pass the exam you have other fields to study. Nobody tried to convince her by showing the important mathematics. Throughout her attitude showed that she doesn't want to change her developed attitude. She justifies it through many ways that she is right and never tried to change her attitude.

Hajara: Why mathematic? Just leave mathematics. We have other options like psychology, Social Sciences, humiliates other basic fields. I thank God for sending someone who invented such software that can help us to solve statics equations. But mathematical equations all depend on ability, and I have never gained and developed that ability.

It is important but it should teach up to the primary level. In my opinion, you should be free whether you study mathematics after 5, 6 grade or not. It should not be compulsory for up to 10 grades. Although she didn't mention that she had any type of pressure, although she suggested to parents and teachers don't force children what they don't want.

Hajara: I request to parents and teachers don't force children and students to do one thing they want them to do. Teach and guide them what is good and bad but don't force them. Everyone has a different aptitude and IQ. Individual differences exist, and based on these differences, every child wants to opt for a different field. The one who is studying arts and humanities is not less than those who study medical sciences or engineering. Let them decide help and encourage them to achieve their goals.

Group 2

5.4 Kristina

She is the youngest participant in this study. She was calm and friendly throughout the interview. Some experiences she shared with hesitation and not in much detail. She spoke confidently and used her hands and facial expressions also to show her irritation or frustration. She also became energetic while taking her mathematics course.

5.4.1 The Social aspects

a. School environment

She became discouraged when the people in her surroundings asked for help realized that mathematics is not for her. She blamed herself for not being able to understand mathematics very well in earlier classes. But later when, she wanted to put her effort into it. She realized her teachers and friends surrendered and left her alone.

Kristina: At first, my teacher was very consistent, and they try to get to know me to understand mathematics. I already made up my mind that I didn't get it. When they tried, I have already given up. I also wanted people to help me, but sadly they all give up, including teachers, and didn't really care what I was doing. When I tried to talk with my peers, they also felt that I'm dumb and realized that I shouldn't choose mathematics, and it made me even more discouraged.

Kristina's middle school teacher's impacts on her success and her negative emotions seem too intensified by inequality in the classroom. At the beginning of middle school, she persuaded herself that she would do it seriously and pour her efforts into it. She entered middle school with new determinations this time.

Kristina: She gave up on the start. I would see there to talk to everyone else and do whatever I want. She already makes mind that I am not good, so she really doesn't care. I think that teachers give 30% in developing these feelings of my hate.

She declined to bring her initiative into mathematics class further because of her mathematics teacher's injustice and misbehavior. Her tone of voice was harsh as she recalled her teacher's behavior toward the girl.

Kristina: She influenced me in a bad way because she really realized to me that I don't need to do it. I don't want to try in her class because when I actually tried. This time I actually try all the other times I didn't. It makes sense she only tries to feel me badly by saying my grade very loudly and not talk to me. She didn't do it with anyone else—one of my class fellows worse than me. If I got 2 or 3 and the other girl got 1, she was still nice to that girl. She was precise to her not stroke her back. Oh, have to try this. Have you tried this? (She explained in a bad tone). She talked to her in a very nice tone, but to me, she feels I really don't care.

The taunts of friends made her more frustrated and upsetting than the grievances of the teachers. She has many friends; almost all of them have good knowledge of mathematics, except for Kristina. But on other subjects, she's fine. She even heard bad words from her peers and friends at times.

Kristina: Yes, both the teachers and my classmates humiliated me sometimes, or you can say, I felt humiliated because I wasn't up to mark in this particular subject. Particularly when classmates would ask me about the numbers, I got in my test, so this is when I used to get frustrated.

b. Family

She satisfied that, even though she doesn't have a good education family background, her family still encouraging her to do it. Sometimes, she felt pity for it, and it is out of her range. She can't change her parents and sisters' negative attitude for mathematics.

Kristina: They (parents) are not highly educated, so they don't know the types of algebra, linear programming, and stuff. They want to do me better, but they don't know how to do it by themselves, and all of my sisters also don't really like mathematics, and they are not good at it.

Somehow, these extra coaching classes help her to manage and passed her last math exams. She doesn't have any person at home who can help her in develop understanding of mathematics concepts, but she was continuously getting moral support from her father.

Kristina: I got the lowest of the lowest grade. I got 3 and 4 but not 1 and 0. I cried a lot. I was just frustrated because I started my study before 3 or 4 days before the test. I didn't understand any think in stress get frustrated and start crying. I cry alone and sometimes in

front of my dad. Because he wants the most too excellent in mathematics, always asking how things were going. I want to do the things which he wants from me.

5.4.2 Affects

a. Attitude and beliefs toward mathematics

She thought it's the nature of mathematics subject that give more to develop hatred feelings in her. Earlier she mentioned that mathematics contributes 10% and teachers 30% in developing these negative attitudes.

Kristina: It is more because of the mathematics subject because I can't do mathematics. I had many teachers, so I felt I am actually dumb in mathematics, so I don't like it.

She discussed the importance of mathematics in daily life. But she is blaming herself again that she didn't try very well. She didn't like any part of the mathematics, not even basic because she didn't know how to do it, even plus and minus.

Kristina: Be honest, and it's everything in mathematics. It's hard to understand fully. Sometimes, I know how to do things but didn't get to the right answer because I don't know plus, minus, and division.

b. Perception about own self

Kristina asked why and how she developed such perception about her own self, she explained it that she doesn't have encouraging environment related to mathematics and her own guilt of being irresponsible. Many times, she blamed herself not trying to work hard in mathematics.

Kristina: I had many teachers, so I feel I am actually dumb in mathematics, so I don't like it.

Each time she didn't forget to blame herself, she doesn't have good feelings for this subject. Therefore, she doesn't like this subject and blamed 50% herself, performing not well.

Kristina: 10% peers and family, 10% humiliation and the rest is me that I didn't work hard enough and didn't put more effort in. I hate to feel like this; I am not able to do it. I am the kind of person who cannot do it, and then I don't put effort into it.

5.2.3 Emotions

Owing to frustration and anger, she loses her attention on the exam. She also noticed physiological changes in her body because of mathematical tension and frustration. Throughout her childhood, she met distinct feelings when doing mathematics.

Kristina: Every time I had a mathematics test, I feel really stress. My heartbeat became faster, and I could not be able to speak time before the test. I come up with stress, and my palms get sweaty, and I lose focus. From when I read the first question, the feeling of anger and frustration builds up. I really lose focus, so even if there is a question I can solve, I lose focus and end up not solving the problem correctly. When I read the first question, then feelings of anger and frustration builds up and builds up. It makes me angry. I really try to focus even if there is a question I cannot solve.

After the exam she was relaxed, and she doesn't have any fear of being failed. Because she already knows she is not good in it and will fail.

Kristina: It often happened before the test. The only problem would be to execute the test, not after the exam because I know, I am going to get bad grades, I get 1 or 2 even. I am not scared about that, but it's the fact that I have to sit there while I know I can't solve it.

a. How hatred developed

She remembered that this disliking for mathematics subject developed in second or third grade and the reason is that she didn't get good score in it. She never feels that she is a good student in this subject, and she never compete her fellows in mathematics. This frustration and disliking to math eventually it converted into hate.

Kristina: I am an open person, and I am not afraid to speak and not afraid scared to raise my hand to ask anything, but when it came to mathematics, I did not really do well at all. So, in mathematics class, I felt shy and used to sit back and didn't raise my hands even when everyone else was doing that. I didn't get the score, and I accepted it and do not do more. It was the right of way, but I remember that I was in my second or third grade since it started disliking this subject.

The thing that hurts and irritated her even more is she humiliated by her teacher. She admired her teachers, but she embarrassed in many times, such as not talking to her, exposing her

grade publicly, and getting a distinct attitude towards the same level of students. She declined to bring her initiative into mathematics class further because of her mathematics teacher's injustice and misbehavior.

Kristina: She tried to humiliate me, but I am not the type of person to get humiliated easily. I know everybody knows I am bad in mathematics anyway. I don't know for some reason, and she really tried to humiliate me. When she gave back my test, she gave very openly to showing my test in the class. I don't care because all of my friends know, but I saw that she tried to humiliate me by showing my first page and grade very openly, just tried to let me feel bad.

It makes sense she only tries to feel me badly by saying my grade very loudly and not talk. She didn't do it with anyone else—one of my class fellows worse than me. If I got 2 or 3 and the other girl got 1, she was still nice to that girl.

b. Duplex theory of hate

She has strong negative feelings for mathematics, but neither has she wanted to hurt mathematics nor teachers and fellows. Those make jokes and discourage her and feel that she is stupid. Because she is a girl like to enjoy the life.

Kristina: No, it was just only I was just making anger myself. I don't get anger with anyone. I am someone who likes to joke around myself. I probably humiliated some of my other peers as well. But I didn't mean any malice behind it. They were all joking and having fun around me, even at my caste. I am angry about it because it was my fault for not being able to do the mathematics. I didn't think to hurt anyone, not even mathematics.

In her opinion, people in her surroundings and her negative feelings towards mathematics are responsible for developing this hate. Other than stress she elaborates her feelings.

Kristina: Its anger and frustration and frustrating myself when I can't get it. When I see others, it just feels me like I am stupid.

She also mentioned that her friends even saying these expressions around her. In contrast, their action is totally different. She listens to such negative sentences in school and at home as well. It can also be a reason developing negative attitude toward it.

Kristina: Even though they said around me that they hate mathematics, they still get good grades. Maybe I also learn from them.

5.4.4 Change in Perception

Many times, she tried to change her feelings and mindset for mathematics. Firstly, she always encouraged herself and tried to turn her thought in positive directions. For this, she listens motivational speakers and came to know where the problem is and how she can overcome it. To get admission in the university; she has to improve her grades in mathematics. This time, she is trying to change her mind-set before taking mathematics subject and it works.

Kristina: I am taking my high school course again to improve my grade, and I am taking mathematics next year just to try again because I don't even know how's 2 times table, I don't know how to minus and plus with lots of numbers. I want to work with plus minus and tables to do further study. This time I am motivating with positive attitude, maybe it works.

5.5 Laila

She enjoyed talking about her past; throughout the interview, she was energetic and sharing her experience openly with detail. She enjoyed many questions and gave answer in amusing way. Nowadays she is doing practice as nurse in hospital and enjoying her work. She is a good speaker and, in her spare time, often she made videos to encourage and motive people.

5.5.1 The Social aspects

a. School environment

She has experience of schooling from 3 different countries. Mostly she got her education from The Middle East. With different mathematics teachers she had different experienced some left good affect and some bad on her mind. But she remembered one mathematics teacher who taught her for consecutive 3 years, she influenced her in a bad way.

Laila: It was just one teacher, not all. It was in 5th, 6th, and 7th, in 8th grade. I got a private teacher, and we have the same teacher in the class. It doesn't make that change.

Now only Laila, but the class humiliated by her middle school teaches for 3 years. It's not only one type of punishment but many. You have to go to board whether you know or not, she will shout at you and if you are failed to give the answer you had to stay in front of the class.

Laila: One of the punishments was that I didn't like that if you don't understand anything from mathematics. The teacher will ask you in the class to just get up to answer this mathematics problem. Okay, I will go there (onboard). It will be a bit difficult, and she screams at me and says that I can just stay in my place for the period. All students stare at me, thinking she is stupid and a bad girl who doesn't understand mathematics. It was just humiliating, and I felt so bad because I was very good in other subjects, only in mathematics it was.... Ah.

Regarding her friends and classmate, she doesn't have any complains because they know sooner or later it will be theirs turn. All the classmates are on same level and mathematics is challenging all of them.

Laila: We all know each other and living in a small town in the same area. They didn't give negative feedback because they know tomorrow it will be them. The negative feedback mostly I got from the teachers she was so hard on the students.

b. Family

She has a lot of members in her family and it's a combination of both good and bad mathematics experiences. Her mother likes mathematics while her father was literature lover her brother also hates mathematics. She performed well in mathematics when she was getting helped from her mother. Due to having large family, her mother cannot pay attention after 4 grades.

Laila: When I was younger, from my 1st to 4th grade, I was just dependent on my mom. She was just helping me with my mathematics problems. When I was in 5th grade, I was older. I have a lot of younger siblings, and the attention goes spread, and I was alone with a lot of problems and depending on my teachers. My dad was a businessperson; he wasn't around all the time.

5.5.2 Affects

a. Attitude and beliefs toward mathematics

It's the nature of mathematics that makes it challenging for her. Mathematics is challenging for her because she cannot connect it with the real world and see its applications. About the usefulness of mathematics, she said

Laila: Yes, sometimes, in everyday situations, when you need to apply, how many things do you need. The easy mathematics that we have in our daily life is very important. A Lot's of things that we didn't need to learn.

Mathematics subject has no attraction for her because she cannot see it in her surroundings. It was a strange thing for her, when future goals depend on a subject that didn't make sense.

Laila: It is different; it just a lot of numbers and it doesn't have meanings. In my opinion, I can't relate to elaborate on it. So, I can't feel attracted to mathematics. I want to get rid of it. When I was in my school, so it was really strange, the school depended on mathematics, and if you are good at mathematics, you would be good in school and go to the University you like.

b. Perception about own self

She is an optimistic girl and like herself very much. She didn't blame herself for doing badly in mathematics. She blamed it for her teachers that they didn't teach mathematics in a proper way. She frustrated with herself for not being able to finish her work or unable to get good scores.

Laila: I was angrier with teachers, not myself; I disappointed that I cannot complete my assignments.

She was getting good grades in other subjects. Therefore, it makes sense that it's not her fault; therefore, she didn't think or blamed herself. She knows where the problem is. If her base were strong and good, she can do it easily.

Laila: No, I don't have those feelings that I am not a mathematics person. I have a rule in my life that if I need to better at something, I need to go back to basics and learn the basics very good. It can be very good at putting in hard work to get better results. I can't judge myself because I get bad grades in mathematics in some of my classes.

5.5.3 Emotions

She had a lot of feelings and emotions that affect her performance. Whenever she got bad remarks, she took it personally. If someone says you are not good at mathematics it means, I am not good. In her study of medicine, she also needs some mathematics, and she is struggling with it compared to other students. Due to lack of mathematics concepts, it is also affecting her performance and grades.

Laila: Yes, if I talk about it now, it affects me because I am studying hard chemistry, pharmacy and studying a lot related to mathematical thinking and lacked those concepts.

When I have those problems, I need more work to do at home. My friends have a better understanding of something.

a. How hatred developed

"We cannot understand mathematics", later became an excuse for her. Though she also has good teacher, but the bad experience didn't leave her. She didn't blame only one reason for these feelings. Mathematics is hard subject and when teachers were also no friendly.

Laila: I don't know, mathematics is a complex subject, and the teacher was very bad. It just adds it up. It's the same for me the complex mathematics, and the teachers add it up to make the result.

In the mathematics classroom she always sits with stress and fear when she humiliates through different way. This thing needs a lot of effort and energy therefore, she always forced herself to go into mathematics class.

Laila: Yeah, I didn't like to go to the mathematics class. They take a lot of energy. The whole time I was waiting when it is be my turn, and I will humiliate again. I was much stressed. When you are on the blackboard, the class on you and the anxiety thing come to life. Sometimes, I had a questioned, and I am very afraid to express myself. If it fails, I get punished, so I just keep it myself in the class.

She mentioned they were more mental humiliation rather physical. Getting's her out the class making her stands on the board in front of class and screaming.

Laila: We didn't have physical punishment; it was allowed, but mostly it was mental. You can throw out the class. You are not supposed to stay in my class. Sometimes you have to stay in the same place that you were on the board. My teacher mentally punished us.

b. Duplex theory of hate

She had extreme feelings at that time. Having a calm nature, she didn't express herself openly. She has a personal notebook where she expresses her negative thoughts easily. Still, she is using this technique for expressing herself. She was afraid and anger in her school life, she has anger for her teacher and fear being insulted. But she knows the value of mathematics, and she blamed that mathematics teaching style was not good. Teachers cannot relate mathematics with the daily life.

Laila: Yes, back then, I had feared it is in our culture. I didn't fail in my whole school career. I passed all the subjects, so you couldn't get how shameful it is, to not pass the exam. I was very shameful and fearful, what if I cannot pass. That's why I went to my mom in grade 8th. I feel so fear and afraid, oh my God, what can happen if I fail. It's not you can retake that subject you have to take the year again.

When, question came to hurt the mathematics teacher who used to humiliate her. She enjoyed this question and laughed too much. Her response was spontaneous, and she explained it with joy that she can't get rid of her face expressions.

Laila: I just hold that she will vanish or break her leg and not come to school. I don't have the wish to hurting her or killing her. It was not at that extreme, but I hope that she doesn't come to school. I was just hoping she gets a disease, breaks her leg, and vanish her or get into a car accident maybe. I only hold that she doesn't come to school around.

When the questions were asked has she heard about good or bad mathematics around her. Her response was suddenly before completing my question.

Laila: Of course, mathematics had bad always overflow those people around me. My friends don't like mathematics, so I think its overall hate for mathematics.

5.5.4 Change in perception

She mentioned age factor and experience also counts to change her mindset. She said she grew up, building her mindset and perception by observing things and it's different from before. She mentioned two good mathematics teachers who helped her to change her perceptions and made mathematics subject easier for her. But the worse thing is, these teachers she got for small period.

Laila: When I was in my last year of elementary school, we have the tough exam at the end of elementary school. We just have a very good mathematics teacher. It was eye-opening for me to find mathematics a little bit easier than I was before.

She gave suggestion which she experiences that is missing in school education. All types of mathematics that we learned present around us, but we cannot understand it. In her opinion, connect to mathematics with daily life and group work might make mathematics more practical and enjoyable.

Laila: I think they should have a good school system on mathematics with everyday items. Even calculus, algebra, geometry, and all the things present in our lives still, I don't get it. If we learned to connect everyday life with mathematics, it would be joyful, useful, and easy to understand. The teachers don't need to teach 1+1. There should more group assignments and tricks to do mathematics.

5.6 Karen

She is the eldest participant in this study and a competent woman in her field of life. She was cooperative and shared her life experience without any hesitation. She took time to explain things with a logical way that shows her rational way of looking at things. She worked with three different countries and has experienced as a teacher and IT programmer. She has also owned and operated her own business for several years. Currently, she is involved with pedagogical programs at the university level.

5.6.1 The Social aspects

a. School environment

Her school environment has structured in such a way where students are not allowed to talk teachers freely. Being a confident student in mathematics class, she asked if she was not getting anything. But it was useless because the teacher didn't try to explain the things in another way. Teachers were just repeating themselves that made the content of mathematics was not so attractive to her.

Karen: All the algebra and geometry and the way it taught at that time it was difficult and not interesting. I see the points and the teacher was explaining the same again and again. They couldn't explain it in any other way to connect with something.

Mathematics was challenging not only for Karen, but all students were equally struggling with it. She didn't get extra classes for mathematics, but one of her fellows helps her in mathematics. His help also didn't work too much. Regardless of one teacher in her secondary school, she had good teachers. She responded to the question: about her teacher's responded on mathematics performance by saying,

Karen: Indifferent, it felt to me as I didn't hear. He was not like to comment on your performance if it were good or bad. We just go and collect our marks and that was it. There are no positive and negative remarks in my memory.

b. Family

Everything she did on her own behalf demonstrates her courage and intelligence. Her brother did well in mathematics because he used extra year to complete his degree. Moreover, she has an educated family background where her father was an administrator. Although her

mother was not completed her education, she had a natural sense of mathematics and able to run her household activities effectively.

Karen: My mother didn't have very much schooling certainly not in mathematics, but she had a natural sense of mathematics. She was sewing, cooking and in the practical where we need to measure the things. If you can make clothes, you need a good sense of 2 and 3 dimensional to measure the things. How it will fit how much fabric you need.

5.6.2 Affects

a. Attitude and beliefs toward mathematics

She likes the visual parts of mathematics that can be applied to the real-life situations. She struggled with complex concepts that were difficult to visualize.

Karen: I didn't mind all those parabolic graphs we have to draw lines and find out where these lines hit the parabolas or cut two points, and then I didn't mind. I can draw, and I can visualize, and I could check if I worked it out correctly because the visual and arithmetic parts are connected. If I did, one could check the other and the other way around. That was OK and statistics was also OK. Geometry was OK; it was mostly algebra.

Mathematics is now taught in a more effective way that it was while she was in kindergarten. She is good at basic mathematics and can easily do it. In her home country she could drop it in the fourth year, and now it is teaching differently that it was before.

Karen: It would not have been a proper tool that was not a meaningful and fun way to do mathematics when I was looking.

b. Perception about own self

She is a very intelligent and competitive girl. She never underestimates herself, but mathematics made her disappointed.

Karen: No, at that time, maybe I had such thoughts but not anymore. It was more disappointing to do it, but I wasn't afraid and embarrassed doing mathematics.

She disappointed that she didn't get the right results based on her energy and efforts that she was putting in mathematics subject. Being an optimistic person, she has a confident in herself

abilities and believes that she can solve problems. But she is consistently wrong and disturbing when it comes to mathematics problems.

Karen: I want high marks. Maybe I was also in secondary school, I frustrated because I was putting so much energy just like other subjects, but I didn't get high marks. It was the mismatch all the energy I put in it and the fact I am not getting outputs. I couldn't stupid because I could do so many other things and why I didn't grasp the mathematics.

5.6.3 Emotions

Her school system discouraged the students to take mathematics further who was struggling with mathematics and physic. That made her frustrate because she wanted to continue her future in a field that requisite her to use mathematics, and she was not happy in cutting off her professional possibilities.

Karen: I wanted to go into a profession where I need mathematics, so here come the frustration. I advised not to take mathematics further after the fourth year to choose other subjects, which also cut off my career possibilities.

a. How hatred developed

The problem with mathematics was started in her secondary school. There was a clear division between those who were good and liked it. Those who are not good at mathematics and didn't like it. It was becoming difficult for me and caused frustration and dislikes. Mathematics teacher's nature also contributes to developing this dislike into hate.

Karen: The hatred comes from the fact that many people from mathematics and the secondary school teachers found themselves so important and their subject. If you didn't understand their subject and feel you dumped in a way, and it was different from other subjects. I always mean some students are good in one subject and some are in others but these feelings of mathematics teachers that they are superior to others and their subject are superior to other subjects. I will cause to hating and because their subject is superior into combine feeling that you dumped, and you don't understand it.

When it comes to how intense her feelings are, how she wanted to remove mathematics, she doesn't want to kill or destroy; she wanted to push it away from her life.

Karen: No, there is no pinpoint. I think hate is more like “a big distance”. You don’t want to do anything in it, so you push it further away from that you hate it. If you say you dislike it, you don’t push it away yet, but it’s like you don’t want to do anything with it. It is like you block it out when you say I hate it.

She had these negative feelings, but she was unable to interpret them. When she observed people around her who hate it due to any reason, she also realized that she is also falling in this category.

Karen: There is something in you, but you cannot interpret you haven’t given it named yourself. When you heard from people they hate and suffer, you realize they also said you are also in that range. It is more coming from outside and labeling. I never said that I hate mathematics explicitly.

b. Duplex theory of hate

Stressful environment in her surrounding and as a girl people discouraged her to take it further makes her stressful that causes to develop negative attitude. When she noticed people in her surrounding complaining about how much they dislike or hate mathematics for various reasons. She found herself that she also fit into this group.

Karen: Yeah, negative feelings came a bit when people say in my surrounding that mathematics is difficult and that we as girls were more discouraged to take mathematics as a subject. It influenced me but at the same time, when I later continued in teacher training college, it motivated me to make mathematics as assessable as possible.

After struggling with this subject, she dropped mathematics without reacting strongly. She focused her favorite subject and put her efforts that she liked. She explained her hate that when ones finished with one’s efforts and patience then one started to blame the system, teachers, and mathematics subject.

Karen: Yeah, I got anger, but I think instead of anger it also the feelings of incompetent that why I can not get it why there is exactly this way to do it. I had this sort of anger, and when you hated it, you stop being angry at yourself and don’t blame yourself any longer. That is the difficult phase that you are struggling. Then, you blame your subject your teacher and the system.

The nonsense part of mathematics she wanted to remove that cannot see in real world. There is no need to add such text that you cannot explain where we use. Her hates wanted to make distance from mathematics than destroy or kill it.

Karen: I think hate is not always like to want to destroy and remove. You can hate it without wanting to destroy or kill it, but it can also that you want to keep a distance or want to change it completely. So, I wanted to make distance and I didn't want to do anything with it at that time of mathematics in school.

5.6.4 Change in perception

Her life partner motivated her to change her mind about mathematics by sharing beneficial, logical, and enjoyable information. Her teacher training courses also helped her to change her perception where she enjoyed the new mathematics topics, taught differently and joyfully.

Karen: In my teacher training, I also have mathematics It was just easy, and I started to like it again at teacher training college. Because now they have different method, and it was more how you could teach mathematics in a more playful way to teach.

Teachers should also realize and try to change their behavior so that students can learn mathematics instead of learn to hate and fear. She appreciated this study and recommended conducting similar research work at an early level with primary and secondary school to overcome this problem.

Karen: I think it's very important that it recognized that people dislike and hate mathematics. I hope teachers will realize that they are as part in that, and they hopefully try to change. So that children don't hate it and don't fear it. A lot of children have also feared for mathematics.

5.7 Explanation of triangle of hate

In this part, the duplex theory for hate has been used to present the data in a figure. According to Sternberg, the dot's position in the triangle of hate shows which element of hate is dominant in the personality of the participant shown in figure 5.

Triangle of hate for group 1

Ali

The dot position in the Ali's triangle indicates that he has all the three elements in his hate. *Disgust/Distancing*: he was humiliated and faced favoritism by the mathematics teacher that causes creating hate and distance from the teacher and subject as well *Anger/Fear*: he wants to remove the person who invented mathematics shows his depression, anger and hate for the subject. *Devaluation/Diminution*: he thinks it is an alien language that he cannot understand.

Anashe

The view of the dot showing Anashe has two elements in her feeling of hate. *Disgust/Distancing*: due to her struggle with mathematics she wanted to distance herself from the target. *Anger/Fear*: she has a phobia of fear, anger, and frustration but doesn't want to hurt the target. *Devaluation/Diminution*: she didn't show contempt for mathematics; therefore, this element is absent in her hate triangle.

Hajara

Hajara has two dominant elements in her feeling of hate. *Disgust/Distancing*: being an intelligent student she wanted to know the relevance to mathematics with the real world. These unanswered questions lead her to create a distance the target. *Anger/Fear*: sometimes, she experienced anger and frustration but didn't want to hurt the target. *Devaluation/Diminution*: she didn't show contempt for mathematics; therefore, this element is absent in her hate triangle.

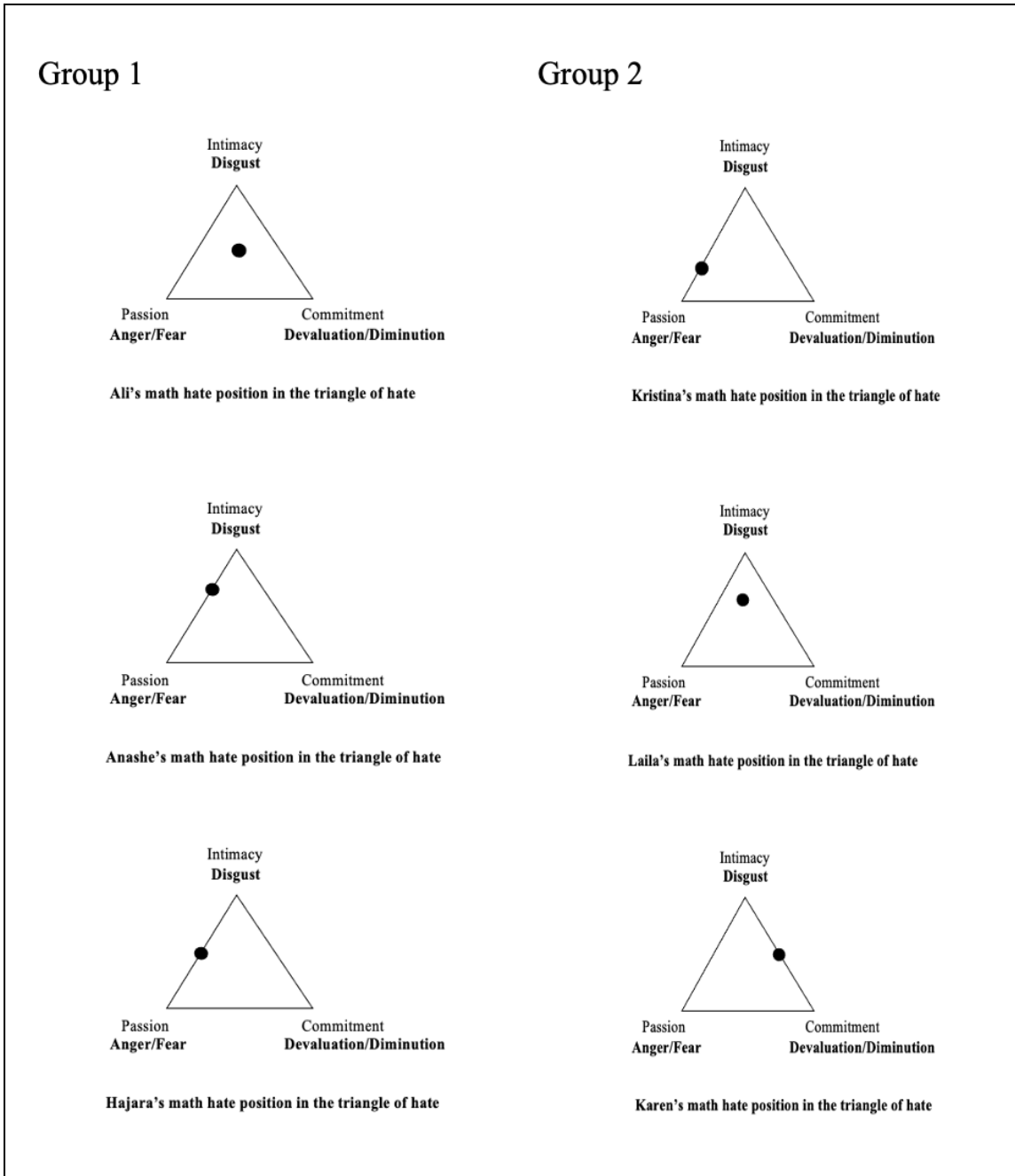


Figure 5. *Triangle of hate for both groups*

Triangle of hate for group 2

Kristina

All elements of hate are present in Kristina's triangle of hate, but passion is dominant than other element. *Disgust/Distancing*: Due to humiliation by her teacher, Kristina was “distanced” by that teacher. *Anger/Fear*: This humiliation created fear. She cried a lot,

which shows how her emotions were strongly affected. *Devaluation/Diminution*: Kristina did not show in any way contempt for mathematics, but she heard non positive remarks about mathematics in her surroundings.

Laila

Disgust/Distancing: Being humiliated many years from her mathematics teacher she wanted to avoid both teacher and subject. *Anger/Fear*: This fear of humiliation created anger and hate to kill the mathematics teacher. *Devaluation/Diminution*: Laila also wants to remove the complex parts of mathematics. That shows she has all three elements where passion and intimacy are stronger than commitment

Karen

The hate triangle of Karen shows that she has intimacy and commitment while passion is absent in her hate. *Disgust/Distancing*: Due to the abstractness of mathematics, Karen created a distance to mathematics. *Anger/Fear*: she doesn't show any strong feelings. *Devaluation/Diminution*: she shows contempt for mathematics by removing some difficult parts of mathematics.

From figure 5, it can see easily that Anger/Fear and Disgust are the most repeated elements expressed in both groups. While the element Devaluation/Diminution is absent in group 1 but dominates in group 2. Furthermore, in group 2 all participants have different types of hate in the triangle of hate, while in group 1, two participants hate for mathematics have same elements. Overall, all participants are differed from each other in describing their hate of mathematics.

B. Analysis of quantitative data

5.8 *Self-efficacy scales*

a. General self-efficacy (GSE)

Self-efficacy beliefs are the required mental power to own abilities, ideas, motivation, and capacity to handle and achieve long and short-term problems. GSE help to understand how

respondents have perceptions about themselves about addressing daily challenges. The given table below indicates the detailed analysis of the General Self- Efficacy scale of both groups. It also shows the responses of each respondent regarding GSE.

Statements	Group 1			Group 2		
	Ali	Anashe	Hajara	Kristina	Laila	Karen
1. I can always manage to solve difficult problems if I try hard enough.	4	4	4	2	4	3
2. If someone opposes me. I can find means and ways to get what I want.	2	1	4	3	2	3
3. It is easy for me to stick to my aims and accomplish my goals.	4	4	4	2	3	3
4. I am confident that I could deal efficiently with unexpected events	3	4	4	3	4	4
5. Thanks to my resourcefulness, I know how to handle unforeseen situations.	3	4	4	3	4	3
6. I can solve most problems if I invest the necessary effort.	4	4	4	4	4	4
7. I can remain calm when facing difficulties because I can rely on my coping abilities.	3	4	4	3	3	3
8. When I am confronted with a problem, I can usually find several solutions.	4	4	4	3	4	4
9. If I am in a bind, I can usually think of something to do.	4	4	4	2	4	3
10. No matter what comes my way, I'm usually able to handle it.	3	4	4	3	4	3
Total score	34/40	37/40	40/40	28/40	36/40	33/40
Percentage	85%	92.5%	100%	70%	90%	82.5%

1 = Not at all true 2 = Hardly true 3 = moderately true 4 = exactly true

Table 5. *General self-efficacy scale*

The above table shows the comparative analysis between the two groups regarding GSE. Data revealed that in group 1, the respondent Ali agreed that it is exactly true he can always

manage to solve difficult problems if he tries hard enough. Anashe and Hajara also have the same opinion about the statement. Whereas the second group's responses show that Laila agreed that it is exactly true, she can always solve difficult problems if she tries hard enough. Karen thinks moderately true about the statement. In contrast, Kristina believes that it is hardly true for her.

In group 1, the respondent Hajara agreed that it is exactly true if someone opposes her, she can find the means and ways to get what she wants. Ali thinks that it is hardly true. Anashe agreed it is not at all true. The second group's responses show that Kristina and Karen have the same opinion that someone opposes them. They can find means and ways to get what they want, and Laila believe it is hardly true for her.

Furthermore, all respondents of group 1 think that it is exactly true that it is easy for them to stick to their aims and do their goals. On the other hand, the second group's responses show that Laila and Karen both agree that it is moderately true. While Kristina thinks it is hardly true for her.

In the above table, all respondents of group 1 think that it is exactly true that they are confident that they could deal efficiently with unexpected events. On the other hand, the second group's responses show that Laila and Karen agree that they are confident that they could deal efficiently with unexpected events and Kristina thinks it is moderately true.

Data indicates that Anashe and Hajara think that it is exactly true that they know how to handle unforeseen situations thanks to their resourcefulness. Ali agreed it is moderately true for him. In contrast, the second group's responses show that Kristina and Karen have the same opinion that it is moderately true that they know how to handle unforeseen situations thanks to their resourcefulness. Laila agreed that it is exactly true for her.

The above table indicated that all the respondents of both groups have the same opinion that they can solve most problems if they invest the necessary effort, and it is exactly true for them. It is clear from the above table that in group 1 the respondents Anashe and Hajara agreed that it is exactly true that they can stay calm when facing difficulties because they can rely on their coping abilities. While Ali thinks that it is moderately true. Likewise, the second group's responses show that Kristina, Laila, and Karen have the same opinion that it is moderately true that they can stay calm when facing difficulties because they can rely on their coping abilities.

The above table shows that in group 1, all the respondents agreed that it is exactly true that when they are confronted with a problem, they can usually find several solutions. In group 2, Laila and Karen agree that it is exactly true when confronted with a problem; they can usually find several solutions, and Kristina thinks it is moderately true.

The above table shows that in group 1, all the respondents agree that if they are in a bind, they can usually think of something to do. In group 2, Laila agreed that is exactly true and Karen thinks it is moderately true. Lastly, the table shows that Kristina thinks it is hardly true. In group 1, all the respondents agree that it is exactly true when confronted with a problem; they can usually find several solutions. In group 2, Laila and Karen have the same opinion about the statement that it is exactly true. Lastly, Kristina agrees that it is moderately true.

Overall, each respondent's score varies, but it can see from the table that the GSE of both groups is high. They are confident about their own coping abilities when confronted with unforeseen situations, but they also believed they find out many ways to resolve the issues without losing their self-control.

b. Math self-efficacy (MSE)

Math self-efficacy shows respondents' self-belief about their ability to overcome the difficulties for solving mathematical problems. MSE help to find how respondents interpret themselves when it comes to solving mathematical problems. The responses of both MSE groups have summarized in the given table 6.

Statements	Group 1		Group 2			
	Ali	Anashe	Hajara	Kristina	Laila	Karen
1. Using a train timetable to work out how long it would take to get from one place to another	1	3	1	2	4	4
2. Calculating how much cheaper a TV would be after a 30% discount.	2	2	3	1	4	4
3. Calculating how many square meters of tiles, you need to cover a floor.	1	1	1	1	4	4
4. Understanding graphs presented in newspapers	1	1	2	2	4	4
5. Solving an equation like $3x+5=17$	2	1	2	1	4	4
6. Finding the actual distance between two places on a map with a 1:10,000 scale.	2	1	1	1	2	4
7. Solving an equation like $2(x + 3) = (x + 3)(x - 3)$.	2	1	1	1	4	2
8. Calculating the petrol consumption rate of a car.	1	1	2	1	3	4
Total score	12/32	11/32	13/32	10/32	29/32	30/32
Percentage	37.5%	34.4%	40.6%	31.3%	90.6%	93.8%

1 = Not at all Confident 2 = Less Confident 3 = Confident 4 = Very Confident

Table 6. *Math self-efficacy scale*

The above table shows the responses of two groups regarding about the MSE. The responses of group 1 show that Anashe is confident that using a train timetable to work out how long it would take to get from one place to another and Ali and Hajara are not confident about the statement. The second group's responses show that Laila and Karen are very confident about this statement and Kristina is not confident about it.

The responses of group 1 show that Ali and Anashe are less confident that calculating how much cheaper a TV would be after a 30% discount and Hajara is confident about the statement. The second group data shows that Laila and Karen are very confident that calculating how much cheaper a TV would be after a 30% discount and *Kristina* is not confident about the statement.

The respondents of group one show that they are not confident in calculating how many square meters of tiles you need to cover a floor. The respondents of group 2 show that Laila and Karen are very confident that calculating how many square meters of tiles you need to cover a floor and *Kristina* is not confident about the statement.

Data shows that Ali and Anashe are not confident about understanding graphs presented in newspapers and Hajara is less confident about it in group one. The second group's responses show that Laila and Karen are very confident about understanding graphs presented in newspapers and *Kristina* is less confident about the statement.

The above table reveals that the respondents of one, including Ali and Hajara, are less confident about solving equations and Anashe is not confident about the statement. Moreover, in the second group, Laila and Karen are very confident about solving equations and *Kristina* is not confident about it.

Group one's responses show that Ali is less confident about finding the real distance between two places on a map with a 1:10,000 scale and Anashe and Hajara are not confident about it. Moreover, the above table shows that Karen is very confident about finding the actual distance between two places on a map with a 1:10,000 scale and Laila is less confident about the statement. Lastly, *Kristina* is not confident about the statement.

In group 1, Ali is less confident in solving the equation, but Anashe and Hajara are not confident about the statement. Likewise, in the second group, Laila is very confident in solving the equation, and Karen is less confident about it. Lastly, *Kristina* is not confident about the statement.

Data shows that Hajara is less confident about calculating a car's petrol consumption rate, but Ali and Anashe are not confident about it. Karen is very confident in calculating a car's petrol consumption rate, and Laila is confident about it, but *Kristina* is not confident about the statement.

Overall, the MSE of group 2 is high. As group 2 has changed their perception of mathematics, they also have a positive perception of their abilities in solving mathematics problems. In contrast all the respondents of group 1 have low MSE.

5.9 Statement of hate

As mentioned earlier, the list of hate by Rempel (2019) consists of 52 words having different activities, thoughts, and feelings towards the target. All the respondents highlight the primary action and emotions from Rempel's (2019) statements. These actions and feelings were very basic and more about dislike and frustration rather than killing or harming the target. A total of 18 different actions, emotions and reasons were selected from the list, of which no statement was common to all the six respondents. The reasons, actions, and feelings that all respondents selected have been mentioned in the table 7.

The given table 7 shows that in group 1 Anashe, and group 2 Karen, both hate mathematics because of the absence of love. In group 1 Ali and Anashe and group 2 Karen has the absence of positive emotions for mathematics. It is also observed in group 1 that Ali and Hajara's feelings for mathematics are stronger than dislike. In the second group, all the respondents also claimed that their mathematics feelings were stronger than dislike. The table also reveals that in group 1 Anashe and group 2 Laila feels fear while doing mathematics. Hajara from group 1 has extreme dislikes for mathematics and in group 2 Kristina and Karan also have the same perception. It is evident that in the second group Kristina and Laila have feeling of embarrassed about mathematics. The below table shows that all the respondents from group 1 want to eliminate this subject from their life. In group 2 Karan also has the same opinion about mathematics.

From all the respondents, Ali is the only respondent who wants to exclude the target from his life. In group 2 Kristina and Karan feel repulsion of mathematics in their mind. Moreover, the below table's data shows that Hajara feels anger due to mathematics and in group 2 Kristina and Laila also feel anger due to mathematics. In addition, Ali and Anashe also feel irritation in their mind due to this subject and in group 2 Kristina and Laila have feelings of irritation because of this subject. In the first group, the respondents Ali and Anashe feel frustrated when reading mathematics as a subject. In group two Kristina and Karan also feel frustrated when they read mathematics.

Item No	Statements	Group 1			Group 2		
		Ali	Anashe	Hajara	Kristina	Laila	Karen
1	Absence of love		✓				✓
5	Absence of positive emotion	✓	✓				✓
7	Stronger than dislike	✓		✓	✓	✓	✓
9	Fear		✓			✓	
10	Extreme disliking			✓	✓		✓
15	Embarrassment				✓	✓	
18	Wanting to eliminate the target from your life	✓	✓	✓			✓
22	Wanting to exclude the target from your life	✓					
25	Repulsion				✓		✓
31	Anger			✓	✓	✓	
33	Irritation	✓	✓		✓	✓	
35	Frustration	✓	✓		✓		✓
36	Lack of understanding		✓		✓	✓	✓
45	Distrust	✓					
47	Severe discomfort		✓			✓	
48	Extreme emotion		✓			✓	✓
49	Despising						✓
50	Ignorance	✓					✓

Table 7. *Action and feelings of mathematics haters*

Moreover, it is observed that in group 1 Anashe has a lack of mathematics understanding, whereas, in group 2 all three respondents have the same issue. In all respondents, Ali is the only one who shows distrust for mathematics. Besides, in group 1 Anashe feels severe discomfort because of this subject and in the second group Laila also experiences such a condition. The table results show that Anashe feels extreme emotions because of this subject. In the second group Laila and Karan also feel extreme emotions in their mind due to mathematics. It is also observed that in both groups, only Karan feels despising due to this

subject. In group 1 Ali and group 2 Karen both have their hate for mathematics due to ignorance.

Overall, it is concluded that the word stronger than dislike is chosen the most. Wanting to eliminate the target, irritation, frustration, and lack of understanding are the words that chosen four times. Absence of positive emotion, extreme disliking, anger, and extreme emotion are used by 3 respondents. Absence of love, fear, embarrassment, repulsion, severe discomfort, and ignorance are the words that chosen by 2 respondents. Wanting to exclude the target, distrust and despising are less used words in the above table.

CHAPTER 6

Discussion on results

This chapter will present the result from chapter 5 in two parts: cross-case study and discussion. The cross-case research examined commonalities and differences between the groups and participants for qualitative and quantitative data.

In both parts, qualitative results are presenting in three parts by considering the emotions that have changed the individuals' hatred for mathematics. First, social aspects: in this part of the chapter, social aspects will discuss whether social conditions have affected the individuals' aversion to mathematics. Beliefs and attitude: this part of the chapter will discuss whether mathematics and lack of mastery have affected people's hatred for mathematics. Emotions: in this part, categorize the feeling of hate and present data in visualized and tabular form. A graphical representation for both scales GSE and MSE is also presented in the cross-case study of quantitative data.

In the second part, a general discussion on these results is presented in the cross-case study, discussed in the literature review and theoretical framework presented in chapters 2 and 3 to investigate the answers to the research questions in this part.

6.1 Cross case study

6.1.1 Cross-case study of qualitative data

a. Social aspects

Zan and Di Martino's (2007) triangle (Figure 3) helped to understand the students' attitudes, relationship with mathematics, and their dislike for the subject. Triangle has three significant factors: I like/dislike mathematics, mathematics is, and I can/can't do it. I analyzed the data with the help of this triangle, where each participant has their reason for not performing well in mathematics, the sort of relationship they have with the subject, and why they still have hate for mathematics subject.

In light of Zan and Martino (2007), Ali (group 1) gave reasons that he started to hate mathematics due to favoritism, humiliation, and unhealthy competition among their classmates. He is angry and disappointed with math; he no longer wishes to have or build any even positive connection with this subject. Hajara (group 1) dislikes mathematics because she couldn't connect it to real life and couldn't see how beneficial it is. Therefore, she doesn't

need maths in her life because she has a lot of other opportunities and subjects to earn her name. Anashe (group 1) couldn't perform well in mathematics because she mostly felt alone in this struggle. Math was complex, and it was taught at an inappropriate time of day that causes develop hate for mathematics. These mathematics subjects are still affecting their life that hinders her from changing perceptions toward mathematics so that she couldn't produce a positive attitude about it. In this group, participants have no excellent relation will mathematics, and Ali and Hajara don't want to give a chance. Still, Anashe will try to build a good relationship with mathematics.

The second group's connection with mathematics helps us understand why they dislike mathematics and what it means to them now, according to triad of Zan and Martino (2007). Kristina (group 2) initially did not attempt to study mathematics seriously since the terms were complicated and hard to understand. Later, she tried to put out her efforts, but she realized that the individuals in her surroundings were not cooperative with her, and they left her alone in this struggle and gave up. In addition, her middle school teacher's unfair actions demotivated her from learning mathematics. Now she needs mathematics to complete her education. Therefore, she wants to put her best efforts into developing a positive attitude towards mathematics. Laila (group 2) dislikes the subject due to the complexity of mathematics and the fear of being humiliated and criticized by society. Now she can see the usefulness of mathematics. That's the thing that strengthens her to change her mindset. Karen (group 2) was discouraged in secondary school not to take the mathematics subject in higher classes if anyone had previously struggled. This thing cut out her career possibilities, which frustrated her and caused her to develop negative feelings for mathematics. Later she met people who show her how mathematics can be valuable and enjoyable that helps her to change her attitude towards mathematics. In this group, Karen and Laila successfully build a good relationship with mathematics after a stressful journey. At the same time, Kristina was trying to develop to builds a good relationship with mathematics.

In this study, individuals from both groups complained about teachers' discriminatory behavior the most. Ali (group 1), Laila, and Kristina (group 2) had terrible teachers in middle school and experienced different unpleasant happenings. Ali's interaction with mathematics teachers was far more intense than that of others. The bad experiences cause creating guilt, shame, frustration, and a negative attitude toward mathematics in his school life. Since Ali (group 1) and Laila (group 2) had the same teacher for several years, they often faced

negativity. All of these factors contribute to developing negativity toward the subject and teachers in their minds. When they were humiliated in a mathematics class, they hated teachers and mathematics subject. Another similarity between the groups and among the participants was that none got any person at home who could help them develop basic mathematical concepts.

Classmates' misbehavior is also observed in both groups. Ali (group 1) and Kristina (group 2) complained about it. They both have friends in their surroundings that tease them or laugh at their lousy performance. Ali stated that he had an issue with his classmates as they did not correctly direct him, and Kristina recalled how her friends used to make jokes around her, which sometimes she enjoyed herself. One common thing that all participants from both groups have been that they asked for help from their friends, but they feel that support has not caused a positive effect even though their classmates tried to help them. In addition to friends who have tried to help, it's their extra coaching classes outside the school. Kristina and Laila joined the different categories to pass their exams. They mentioned that their family members have neither time to help them nor have mathematical skills to explain complex mathematics concepts. The rest of the participants didn't take any extra class, although they asked for it. Ali (group 1) and Kristina (group 2) have people in their homes who hate mathematics, while all other participants have a healthy family environment in their surroundings.

b. Beliefs and attitude

During the analysis of the interviews, one perception often emerged about mathematics that the group had in common in their experience. All the participants agreed that mathematics is a complicated subject. It is difficult to relate the mathematics terms and concepts with real-life in higher classes, which causes frustration and disappointment. All participants appreciated the usefulness of the mathematics that they learned in primary school. Later, mathematics that they learned in higher classes is neither exciting nor very useful. Ali (group 1) who has an unhappy and unhealthy bond with mathematics said, mathematics is a supernatural subject, and he wants to undo the person who invents the mathematics subject. In this way, mathematics will not be existing in the world. Karen (group 2) also suggested all the no-sense, very theoretical mathematical parts that people cannot explain why and where you could use it should remove from the curriculum. Theoretical parts that cannot explain make the subject unattractive and stressful.

When it comes to the perception of their abilities and aptitude, they are sure that they managed to solve unexpected, complicated situations efficiently if they invest their efforts with a clam. Therefore, all participants have a high level of self-confidence and managed to solve their life-to-life problems and come up with many solutions. None of them underestimates their abilities or thought that they are dumb in mathematics because they do what they are determined about in life. Therefore, all participants believed they wanted to take mathematics as a challenge and learn it, but mathematics wouldn't let them into his world. Due to their kind nature, Anashe (group 2) is the only participant willing to forgive the mathematics and give it a chance to enter her life, although she hates it. On the other hand, Hajara, Ali, Laila don't want to study it more.

Ali and Hajara (group 1) are the two participants who have a strong reaction towards mathematics subject than other participants, and they thought mathematics is not very useless. Hajara wanted more concrete use, which is very challenging to show in this subject. She also explained that the mathematics problems would not be relevant in their lives and the learning is useless. Ali said it's an alien language created by supernatural powers. We did not need to study this subject on the earth. Therefore, it should not be applicable, and it is impractical to teach this subject in schools.

c. Emotions

In group 1, all participants have strong negative emotions for mathematics, but Ali and Hajara do not have any space for this subject in their lives. Ali showed strong emotions by seeing that he wanted to remove mathematics from the world, and the language of mathematics is alien's language. Ali's negative feelings and hate for mathematics are influential and prominent because this hate involved a lot of humiliation and punishment that started in secondary school. Hajara said that nobody explained to her why we need mathematics and where we use it, and she avoided doing mathematics in her high school. Her feelings and hate for mathematics are strong, that she avoided sharing anything by saying that she doesn't care about mathematics and she believed her hatred started due to mathematics' complex nature. She always felt that she is the only one who is struggling with this subject. The worst thing is that she cannot share her feelings with anyone that developed in grade 5. On the other hand, in group 2, all participants show flexibility in their thoughts and emotions for mathematics subjects. Kristina hates mathematics due to a lack of understanding of this

subject and developed in the middle class. Laila said bad teachers and complex nature are responsible for developing hate for mathematics in middle school. Karen believes the irrelevant and challenging nature of mathematics causes them to create negative feelings in her secondary school.

Ali and Hajara (group 1) mentioned corporal while Laila and Kristina (group 2) said punishment mentally that they got in the mathematics classroom. Ali related two stories from mathematics class, both of which included many negative strong emotions and feelings. For Ali, the most painful exercise was being humiliated and insulted in front of the opposite gender instead of getting physical punishments. Ali also experiences corporal punishment like being beaten by a stick, standing in and outside the classroom, and stressed positions. Laila (group 2) also got a penalty in mathematics class, where she was supposed to stand in front of the class for a whole session. Kristina (group 2) also complained that she had been neglected in the mathematics classroom in many ways. Once Hajara's (group 1) mathematics teacher beat her, she claimed that she didn't care about it because it was the first and last time she got punished. But after this incident, she avoided mathematics and ended up with hate.

According to Sternberg (2003), disgust/distancing and anger/fear were the most observed elements that participants have in their hate. When it comes to distancing, two sides are observed. First, those participants want to learn mathematics, but the teacher's behavior created a distance between the participants and the subject. Later this distance increased and causes to starting hate not only for mathematics teachers but also for the mathematics subject. Initially, they want to learn mathematics and all participants put their efforts into it because they didn't feel hate for the issue when they entered the school. Second, participants were also motivated by saying that they don't need to put much effort into mathematics. They need it to pass the mathematics exams at a particular grade and don't need to opt for this subject in further study instead of showing how mathematics is helpful in day-to-day life.

Unfortunately, it is a very insulted and wired thing in some cultures if a student gets low marks or fails. Society pressure and fear of being unable to meet the standard level causes to develop many negative feelings. Participants are afraid of being forgotten by teachers, insulted by their peers and family created negative feelings for mathematics. This fear and negative emotions are followed by anger, depression, frustration, and they end up with hate for the subject. Participants also show Devaluation/Diminution in them.

	Group 1			Group 2		
Types	Ali	Anashe	Hajara	Kristina	Laila	Karen
Cool hate						
Hot hate						
Cold hate						
Boiling hate		✓	✓			
Simmering hate				✓		
Seething hate						✓
Burning hate	✓				✓	

Table 8. *Types of hate participants have*

6.1.2 Cross-case Analysis for Quantitative Data

Regarding GSE and MSE in group 1, Ali (85% GSE & 37.5% MSE) and Anashe (92.5% GSE & 34.4% MSE) have high confidence responses toward GSE and low confidence toward MSE. They both are the same almost level of confidence about their abilities to cope with different unseen situations. When it comes to mathematics problems, their confidence level goes down. Moreover, the third respondent from the same group, Hajara (100% GSE & 40.6% MSE), has a very confident high GSE level and a low response toward MSE. She is the only respondent who has 100% confident about her abilities and thoughts. Through her interview, it was observed that she never has any doubts about her abilities and come up with different and reasonable solutions. When it comes to mathematics problems, she even doesn't want to consider mathematics problems because she was confident to score high even without solving mathematics sessions. Further, the low percentage of solving mathematics problems somehow supports the respondent's claim that they are not confident about this subject. In group 1 all participants have low MSE that is directly proportional to their claim that they still hate mathematics and didn't rely on their own MSE skills.

Moreover, group 2 shows that Kristina (70% GSE & 31.3% MSE) strongly perceives GSE and has a weak perception toward MSE. She is the only respondent who has the lowest GSE

and MSE, and she is also the youngest respondent in the study. The second respondent Laila (90% GSE & 90.6% MSE) and the last respondent Karen (82.5% GSE & 93.8% MSE) also show that they both are very confident toward GSE. A successfully positive developed attitude toward mathematics showed they also have a confident high level towards MSE. This shows that respondents in this group are confident in dealing with their daily problems and have confidence in solving mathematics problems. In group 2 all participants have high GSE, but Laila and Karen also have high MSE along with GSE. That show if ones develop a positive attitude towards mathematics subject, MSE also can affect positively. While in the same group Kristina has High GSE but low MSE, the reason for having low MSE in group 2 can be many. From the interview, it was observed that Kristina (group 2) is trying to change her attitude and beliefs before retaking mathematics subject which shows she just started her journey to change her attitude and perception. This time she is motivated and trying to learn and see the mathematics with good feelings. It is also observed Kristina is the youngest in this study so age can be a factor. It can be possible that over time if she has a good interaction with mathematics, she would also be able to rely on her MSE skills. Graphical representations of both scales have shown in the given figure below.

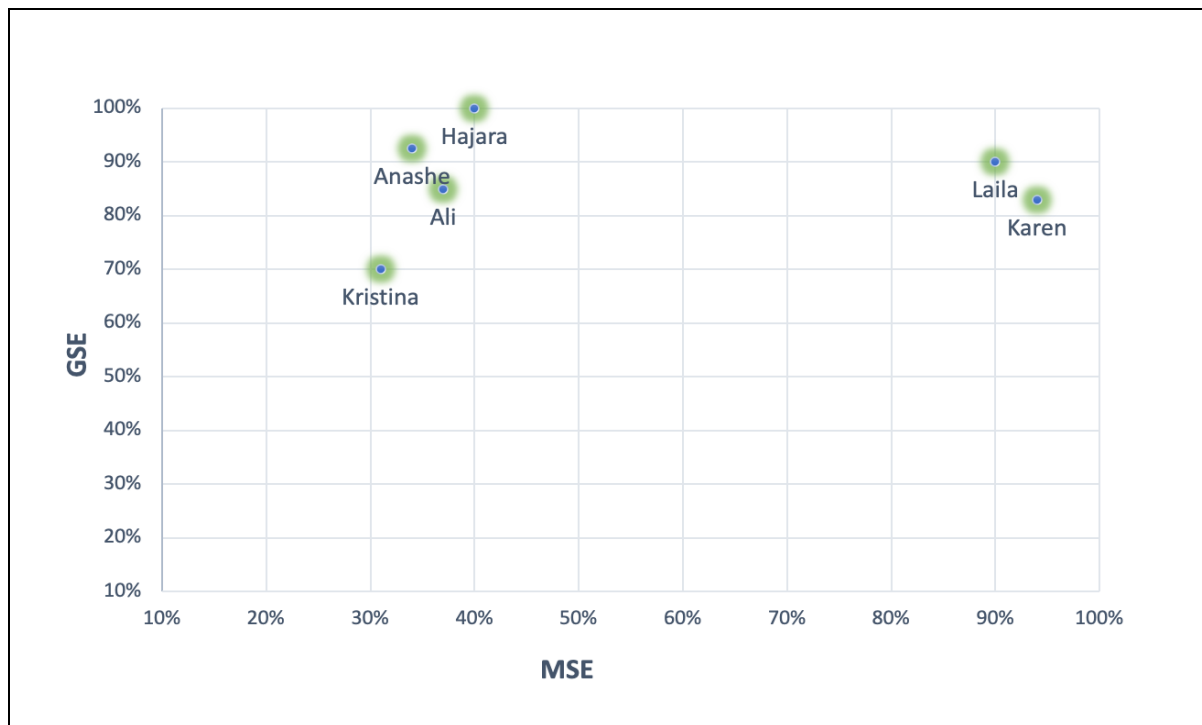


Figure 6. *Graphical representation MSE and GSE*

The graph of comparative analysis between two groups about GSE scale and MSE shows that hater of mathematics having lack of confidence in MSE. On the other hand, if the respondent's hate had faded, they are optimistic about solving mathematics problems. On the vertical scale, the percent score on the GSE scale shows that all respondents score above 70, and except for Kristina, all respondents' scores are between 80 and 100. On the horizontal scale, the percent score on the MSE scale is given. There is a distinction here: Karen and Laila score on the MSE about as high as on the GSE. The rest of the respondents from group 1 plus Kristina, score lower on the MSE scale than on the GSE scale.

6.2 Discussion

a. Social aspects

Unpleasant experiences in learning mathematics led students to develop negative beliefs and attitudes towards mathematics (Itter & Meyers, 2017). This supports the finding that participant's (Ali, Hajara, Laila, Kristina) bad experiences with mathematics subjects in the form of fear by failing, humiliated, got punishment in front of the whole class, the complex nature of mathematics and teachers injustice behaviour causes developed hate for the subject. Furthermore, an anti-social environment in which students cannot work together or even cannot ask for help show a weak relation between a teacher and students and make mathematics bore and unpleasant (Boaler, 2000). This argument is consistent with the participant's description of the dominant mathematics teacher nature that they experienced, and almost all the participants mentioned in their interview that it is also a reason to develop a negative attitude toward mathematics. Additionally, participants lacked adequate help at home to aid them to overcome their misunderstanding of mathematics concepts. This finding supports Fotoples' (2000) suggestion that parents can encourage their child to learn through “*math night*” in their family. Furner and Berman (2003) used “*family math*” for the same concept.

Furthermore, participant's (Kristina, Ali) was also teased by the fellows that frustrated them and feeling annoyed, which is consistent with the Swan (2004) work that sometimes, they feel annoyed and frustrated when their good fellows teased them, and this fear gradually turned into hate. From literature, it is founded that the activities children learn from their surroundings are internalized through the mediation of tools like language (Aimin., 2013). This supports the finding that Kristina (group 2) used to listens to negative sentences about

mathematics in school and at home as well as “*I don’t like mathematics*” or “*mathematics is difficult*”. In contrast, her friends’ action is totally different; this could be a case to developed negativity in her for mathematics.

Unforeseen findings in this study are corporal punishment, favouritism, and ignorance by mathematics teachers, which participants faced from time to time in mathematics class. According to Vygotsky, social and cultural interactions play a vital role in a child’s emotional and cognitive development (Wells, 1999). This argument supports the finding that favouritism became a cause to unmotivated them, and they gave up putting more effort and energy into the mathematics class. Because their mathematics teacher attitude is completely different from the same scorer which is more painful and leaves a bad effect on their emotional and cognitive development. Participant's (Ali (group 1), Kristina (group 2)) also claimed that their teachers were angry with them and used to not talk and ignore them in different ways. Kristina also remembered her mathematics teacher polite advice for the lower score and harsh attitude toward her. Ali also mentioned how painful it was when he came to know why he is always scoring low in mathematics and managed to get high marks in other subjects.

All of this demonstrates that hatred does not grow while working alone; rather, it develops as a result of bad social interaction. Here the Vygotsky ZPD works that instruction only assists the child in performing the job and is considering motivating and raising him Wells (1999). But this study shows that these instructions were given negatively where they experienced discrimination, physical and mental punishment from MKO that led them to hate mathematics. “*The distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peers*” (Vygotsky, 1978, p. 86). This supports the finding that bad attitudes and behavior in the classroom destroy the child's belief in achieving the target. These experiences cause to destroy ZPD, that students can achieve the target if they get assistance. Such events lead the child to lose motivation and hinder to going furthers and therefore unable to master or like the subject.

b. Beliefs and attitudes

During the analysis of the interviews, one perception often emerged about mathematics that all participants had in common. Even though the participants had challenges in mathematics, they experience mathematics as a subject is useful if only basic mathematics is taught otherwise; it is neither interesting nor very useful. In Larkin, and Jorgensen (2016) study students used 112 times the word 'hard' in connection to mathematics. This argument is consistent with the participant's description of the subject that mathematics nature is complex, and concepts are difficult to link and relate with the real words. Sometimes symbols and formulas make mathematics questions more complicated and complex, so the students are unable to understand the pivot point of the question Tobias (1979, as cited in Hilton & Pedersen, 1980). This argument is consistent with the participant's description of the complex and pointless nature of mathematics subject that Hajara wants to see concert use and Karen wants to eliminate the irrelevant parts.

Additionally, in learning, students adopt many styles, but one style is dominant, and when mathematics is not taught in their learning style zone, anxiety and fear may come (Dunn, 1984). This argument is consistent with Anesha's (group 1) description that mathematics is a difficult subject for her and it was taught at a bad time of the day when she was hungry and time to going to home was approaching that made this subject more challenging to concentrating. She thought she would be better at mathematics if should be taught in the morning time.

Furthermore, attitude towards mathematics is not one-dimensional, and students have different types of feelings towards a different kind of mathematics context, material, and learning styles (McLeod, 2005). This supports the finding of this study that participants expressed different feelings for mathematics context Karen (group 2) mentioned a specific topic that is difficult to understand, and such topics should not include in the curriculum that cannot be explained. All other participants also said that only basic mathematics is useful the rest is pointless and useless. This is consistent with Larkin & Jorgensen, (2016) those students identified themselves as 'non-mathematical due to the challenging nature of this subject, in particular, because they could not understand its concepts. Hajara (group 1) wanted to know how and where we use this mathematics, how this is useful to study. This finding is consistent with Boaler (2000) mathematics became useless because students could not grasp basic concepts. Lack of meaning, memorization of school mathematics' procedure

and meaningless nature make it useless. None of the participants complained about the mathematics subject involved no fun and having no friends, staying still and listening, working alone, copying work down from the board, and excess use of worksheets found in the literature.

All participants agreed that negative feelings for mathematics developed at the primary level due to the difficult nature of mathematics. But in their middle school, when emotions are developing, and thoughts are shaping they had a bad experiences with this subject that causes them to turn their negative feelings, and they started to hate mathematics. This finding is consistent with Dowker, Sarkar, and Looi, (2016) that negative attitudes towards mathematics and maths anxiety appear to increase when children reach secondary school age, continuing into post-secondary education. Corporal punishment, favouritism, ignorance by mathematics teachers, nature of mathematics teacher, and pointless mathematics are reasons found in this study to develop hate in the participants.

c. Emotions

Anashe, Karen, Laila and Kristina are calm in their emotional's reactions to hate for mathematics while Ali and Hajra have strong emotional reactions towards mathematics. Hajara showed it through throw books and saying she don't care what was happening in her surroundings related to mathematics. That we also found in the previous study those emotions differ in action, behaviour, and culture, but the main pattern and characteristics almost remain everywhere (Bibby, 2002). In Ali case, the anxiety and stress level are so high that he couldn't sleep for many days and curse himself. None of them has negative feelings while entering school and start learning mathematics but with different unpleasant experiences especially humiliation which acts like poisons to destroy relationships and leads to mental illnesses that cause anti-social behaviour like suicide and murders (Donald, 1991).

In Rempel list (2019) of hate shows, all respondents highlighted the different items to describe primary feelings for their negative emotions towards mathematics. From the list stronger than dislike, wanting to eliminate the target, irritation frustration, and lack of understanding are the most observed characteristics that participants have in their hate of mathematics. Lack of understanding, absence of love, ignorance, and positive emotions can be possible for developing negative feelings towards mathematics. The need for separation can be so strong that people wish to get rid of the subject or math teacher. Hateful individuals

in this study do not have such a strong desire to damage other people or the subject of mathematics. Still, participants have in this study to kill the teacher and eliminate the parts of mathematics.

Seen in the light of Sternberg (2003), anger/fear was the most observed element that participants have in their hate. The feelings they feel whenever they encounter mathematics are frustration, irritation, embarrassment, and fear. This argument is consistent with Bhave (2009) that If students losing their grip on frustration, it leads them toward stress and then depression. When his goal, desires, task, get blocked, these feeling converts into strong negative emotions like anger, depression and even hate.

Wanting to eliminate and exclude targets from their lives, and repulsion are the ways they chose to get rid of mathematics choosing from the Rempel list (2019). On the other hand, stronger than disliking, severe discomfort, extreme disliking, despising, and extreme emotions showed their feeling of hate for mathematics subject.

When it comes to people with high or positive self-efficacy choose different and challenging tasks to explore the environment. Once they select a challenge, they try to show their best by remaining consistent and trying to create a new and favourable environment with patience (Schwarzer, Bäßler, Kwiatek, Schröder & Zhang, 1997). This argument is consistent with the participant's descriptions that they know how to handle an unforeseen situation. They rely on their real abilities in challenging situations, but it is the opposite of the mathematics subject. All of the respondents trusted their abilities in handling day-to-day challenges and have a higher level of GSE. Comparison of these two groups and between the participants illustrate that other attitude (e.g., GSE) don't depend on subject performance and these attitudes have no relation between them.

Furthermore, it also shows that high GSE doesn't essentially need higher SE in any particular subject. But only a positive perception for mathematics subject has directly proportional with MSE but doesn't depend on another attitude. This finding is consistent with Schunk and Ertmer, (2000) that high self-efficacy is one of the most important factors in the students' academic success and learning. By adopting different strategies in teaching styles, student's self-efficacy can be developed and enhanced to achieve the level of learning.

CHAPTER 7

Closing

The most relevant facts from chapter 6 will be presented in this chapter as a conclusion. It will discuss the many causes of people's hatred of mathematics and what describes people's hatred of mathematics. It will also be examined how this research could be used in the classroom. This chapter is followed by a critical analysis of the study and a discussion of what modifications may have been made if the research were to be done again. Finally, a variety of research projects will be presented for further study.

7.1 Conclusion

The research aimed to map the hatred individuals have for mathematics. In order to do so effectively, different research questions were chosen. In this section, I will attempt to provide the best possible answers to research questions. Therefore, even though the questions are closely related, it is decided to answer each one separately.

How did the participants develop hate for mathematics?

The findings point to a number of possible factors for the rising of hatred. Hatred for mathematics is illustrated by the fact that the feeling is not innate but arises in the social area. The research showed that the individuals had a positive attitude and were intelligent people who wanted to do mastery in mathematics subject as another subject. Lack of people in the surrounding, who have been able to pass their mathematical understanding and concepts both at school, and home. It is also founded that participants got such teachers who taught them in an unhealthy environment that causes bitterness and irritation for the teachers and the subject. Participants were taught mathematics in an uncomfortable setting, such as the stress of being humiliated, punished and failed causing developing hate for the subject. Feeling of being failed and left behind created a desire to seek assistance from peers but this also didn't work very well. In fact, in few cases, peer competition and improper guidance by classmates created emotions of being alone in this struggle, resulting in hatred for the mathematics subject. These findings indicate that the environment has a considerable impact on learning mathematics and developing attitudes. In middle school, the rigidity of mathematics teachers, unpleasant learning techniques and unexplained mathematics concepts are all factors that

contribute to developing a hatred for the mathematics subject. In addition, participants in this study stated that they developed a hate for mathematics as a result of society pressure that turns their motivation into pressure and feeling alone while struggling with it.

What are their reasons for hating mathematics?

From literature, it is founded that the complex nature of mathematics subject, unpleasant experience of mathematics, the bad role of mathematics teachers, having no friend and fun in this subject, humiliation, pointless mathematics, remain still and only listen and copy are reasons for developing a hate for mathematics. This research also reveals several reasons for the hatred individuals have for mathematics in which unpleasant experiences with mathematics, the bad role of teachers, and humiliation are such findings that confirm from the literature. A few of them are not founded in literature such as favouritism, corporal punishment, and scoring high in other subjects but low in mathematics created negative feelings for the subject are some other reasons for hating mathematics subject founded in this study. Without scoring high in mathematics, they can maintain their position in the classroom also made mathematics pointless for them. All these reasons affect participants' perceptions, attitudes and feelings in a negative direction. Over time, this will create a feeling of hatred for the subject.

What characterizes the participants' hate of mathematics?

The element of anger/fear and disgust founded the most in the participants and this character falls in the burning and boiling types of hate by Sternberg (2003). Although hatred for mathematics is not so violent and arose over time. But the study shows that these feelings didn't emerge quickly and disappears quickly. These negative feelings grew with time and their dislike turning into hate for the mathematics subject grew in the shadow of bad interactions.

Lack of understandings and feeling alone while struggling with mathematics cause irritations, anger, fear, and frustration. These are the most observed characteristics participants have in their hate of mathematics. These extreme emotions cause to create a distance from the subject and eliminate the subject as well. In this study, hatred is described their hate by two ways. In a peaceful way, they just wanted to create a distance from the subject and don't want to ruin or destroy the subject. On the other hand, in serve situations when their hate becomes stronger, they also have a desire to eliminate the few parts of the subject and the person who invented the mathematics subject who made the study more difficult.

Is there a relation between hating mathematics and other attitudes, such as self-efficacy?

GSE and MES scales are used to measure attitude and help us to determine if individual thinking is optimistic or pessimistic towards themselves and mathematics subjects respectively. In group 1 all participants have low MSE that is directly proportional to their claim that they still hate mathematics and didn't rely on their own MSE skills. From group 2 it is concluded that only a positive perception for mathematics subject is directly proportional with MSE but doesn't depend on another attitude scale. According to the findings, in group 1 participants have strong confidence in GSE but low confidence in MSE and in group 2 participants have self-confident for both GSE and MSE. Comparison of two self-efficacy scales interprets that other attitude scale doesn't have any effect on the performance of the subject. Therefore, GSE and MES interpret that GSE doesn't depend on MSE and vice versa for all the participants in this study.

What differences can be observed when comparing this who still hate mathematics with those whose hate faded away over time?

Many reasons are observed that why group 1 still has negative feelings for the subject and why they still have such feelings. One of them is bad experiences that cause to create unpleasant memories in their mind for the subject. Now they don't need this subject in their lives, and their interviews also verify they don't want to change their mindset. For this, they have a reason such that this subject still causes to embarrassing them and create challenges while teaching their children and many painful and unpleasant memories are tight with it that they don't want to remember them. They also claimed that, yet they didn't see any usefulness of mathematics subject in day-to-day life. The second group overcame their hate because they saw some utility and usefulness in mathematics. They also observed how mathematics can be enjoyable and meaningful in everyday life, which helps them to switch their perceptions even though they didn't have mastery skills in it. But they appreciated that mathematics is a useful subject and only a few parts are meaningless.

7.2 Implementation on school

The findings of this study provided understanding into what may be modified in schools to avoid hated among individuals from developing a dislike, particularly for the mathematics classrooms. Interviewing group 2 is useful to know that students were always trying to avoid developing negative feelings at the time of learning mathematics even though they were

struggling with mathematics. They want to develop negative feelings neither for the subject nor for the teachers, although having bad experiences they tried to take it positively. But excess of everything is bad when this negative interaction goes beyond the human dignity they changed into anger, frustration and eventually hate. Therefore, schools and teachers should be careful about healthy criticism but should not cross.

Hate for mathematics in this study is started in the middle school. At that age, students' needs more attention when thoughts are shaping, and feelings are developing at that stage students need extra support, care and encouragement from their teachers and peers. This is in line with Skaalvik and Skaalvik, (2013) that when students get older, their academic work demands more effort, and they need more social support and encouragement. Students' relation with teachers depends on their motivational level and results show that motivation is related to student-teacher relationships and students faced a lack of motivation for their bad academic results. Group 2 showed that attitudes and beliefs can be changed, and this finding was supported by Habberstad (2019) which showed that people have a change mindset and not a fixed mindset. Through motivation, social support and good relation between students and teachers help to change student mindset and increased the performance in the mathematics classroom. It will be rational to try to change the student's negative attitude toward mathematics by the cooperation of parents, teachers and classmates. The learners don't want to develop their negative feelings about the subject nor for the teachers, but the participants are having bad experiences, but they tried to keep themselves positive even in the negative situation. If a person stays positive in the negative situation, so he or she has control over emotions. If the situation goes worse so no one will control the negative feelings like hate, anger, frustration and so on.

I would also like to underline that the findings of this study will mostly benefit for teachers. This research not only offers adequate teaching strategies or such that can be simply applied to the classroom, but it also provides information on people's thoughts about mathematics, which may aid in understanding their attitude. As a future teacher, I have learned how important it is to study emotions, how hatred is experienced, and how hatred has developed. This study forced me to think about how an angry teacher affects students' perceptions for their whole life. Therefore, the role of mathematics teachers should be changed; for example, teachers should not put pressure on the students, not punish and humiliate them. Additionally, I will not wait from the students' side to ask for help I will try to find out who and where my

students need instruction, to go further. Because all the students have different abilities, personalities, and backgrounds, we can solve the problem through dialogue and guideline.

All participants in this study tried to find extra help, but they didn't get it due to their own reasons. It was difficult for parents and children to find such assistance especially in such subjects that involved specific certain terms. In some cases, parents cannot afford it and in others, they cannot find it. Therefore, the schools should facilitate by offering different programmers weekly or monthly basis for such students who need extra help.

From the study, I found that it would be helpful if mathematics teachers get some pedagogical training to show the usefulness of mathematics and how abstract ideas can be taught and connected with the real world. Furthermore, it should be rational that schools should work on designing their course in such a way that mathematics should be present in a useful and enjoyable way by discussing with the trained and experienced teachers and come up with the most relevant, group work tasks and colourful activities in a mathematics classroom.

7.3 Limitation

The biggest aspect of this research is that it is done with people of different age groups, which includes from 20 to 60, and it also includes people from a different region and areas (Europe, Asia, Africa, Middle East) that make this study interesting. Additionally, this work also dealt with emotions that how these emotions developed, grew and why these feelings became so extent that they took the form of hatred. People of different age group and from different culture express their ways of expressing emotions in unfavorable situation differently. With different reasons of hates help to know different expressive ways of hatred among different cultures. For example, in Africa, you cannot express your feelings openly while in Asia, you can express your anger while throwing books or shouting. In the Middle East, you have to struggle on your own while keeping yourself calm. In Norway and other European countries, you have to behave properly whether you like the situation or not, but you have to follow the rules. Of course, it had still not been possible to generalize the findings, but similarities could have given a hint that hates for mathematics is present across the world regardless of culture and region. People from 5 different countries contributed to this study that means 5 different education system comes under discussion that makes study

useful and interesting. Therefore, due to the small sample size that involved only 6 participants of different age groups, cultures, and systems that makes it is incapable to say anything for the whole system or country.

The second weakness is when I was filtering my participants, and I realized that I should have a proper criterion or any instrument to let me know whether the person fitted with my research work or not? After a long discussion, I concluded that one of the persons didn't fit my research, while he kept claiming and persuading me that he's best suited for this job. If I had any scale that would help me to know if that person was useful for my research or not, then I would have gone ahead and interview them. It will also help me to save my time and reduce my confusion and uncertainty of whether those particular suits or not with my study.

Another shortcoming that I found is it's a series of school stories of participants. For these people needed some time to peek into their past and collect memories. Suppose I had sent some questions in advance for few hours before the interview according to the availability of the participants. I might be explored into more depth if participant gets some time to thought, gather and shaped their past feelings and experiences. Because at that time, people needed time to recall and avoided saying that they don't remember at this moment. When participants got time to recollect, it made interview time longer that made situation uncomfortable. Therefore, I could not capture all the thoughts they have properly because when I contacted a few participants again, they mentioned some things more than they didn't remember. Furthermore, this study is related to feelings of hate, and it is always difficult to express feelings in words. It would design more question in the interview guide to address emotions with different aspects rather than only discussing the reasons. Therefore, there is lack of questions that goes in the depth of feeling of hate.

7.4 Further study

During my journey to find able participants, I met with two persons who hate mathematics so deeply that they didn't even want to listen to its name. It showed that they had a strong hatred for mathematics. I tried my best to convince them about the mathematics, but sadly it was of no use. Of course, I couldn't force them. They were great contenders and would've been very beneficial, particularly for my research work. It would be more useful to find such people and convince them how beneficial they can be to understand the problem. On the one hand, where

I met with persons who didn't have a positive attitude about maths, at the same time I also happened to meet with some persons who were in love with mathematics, and it was their favourite's subject. That really gave me the courage and I think we should also interview such people because there is a great potential of mathematics among many individuals. We ought to teach love mathematics that'll help to create positive emotions about mathematics among the masses. It would be reasonable to interview such people to find the reasons and convince the students that mathematics can be enjoyable by showing its different positive aspects instead of only saying it is used in every field of life.

Some new findings hate for mathematics founded in this study that is not clearly found in previous studies that show further study is needed. Therefore, the lack of previous research especially in the field of hate for mathematics demands, it should need to study more on this topic by considering different theories and instruments on both quantitative and qualitative levels. For example, involving a huge number of participants may be to carry out a study that can manage to discuss what kind of learning styles students like to learn or prefer to learn in the mathematics classroom and discuss their emotions. It should be reasonable if we ask the students at what time of the day, they wanted to learn mathematics, or they want to like to learn in groups or individuals. Such type of research would be helpful to reduce the hater for mathematics in future. It should be reasonable if it is carried out with the middle and high grades students in the learning stage by considering how mathematics should be taught in the classroom. For useful research, it is wise to study both sides of the coin. Therefore, I also suggest that a few teachers could be interviewed in further research to understand their difficulties in the classroom while teaching mathematics.

Pandemic made this study more interesting by gathering different cultures and regions at one place, this study was conducted without considering any age or school level. For instance, this research has involved various academic backgrounds and individuals work in different directions and living in separate regions. This made the study not only interesting but also provides some new information. Moreover, in the future with a carefully designed questionnaire, a huge number of participants might provide new directions to this issue, which might assist to identify the core of a problem. Suggestion for further study is this research involving cultural diversity and regions should thus be carried out on a big scale.

Reference

- Aimin, L. (2013). The study of second language acquisition under socio-cultural theory. *American Journal of educational Research*, 1(5), 162-167.
- Akhtar, S. (2018). *Fear, phobia, and cowardice*. In Fear (pp. 3-34). Routledge.
- Andersson, A., Valero, P., & Meaney, T. (2015). "I am [not always] a maths hater": Shifting students' identity narratives in context. *Educational Studies in Mathematics*, 90(2), 143-161.
- Ashcraft, M. H., & Krause, J. A. (2007). Working memory, math performance, and math anxiety. *Psychonomic Bulletin & Review*, 14(2), 243-248.
- Beaumont, P. B., & Bednarik, R. G. (2013). Tracing the emergence of palaeoart in sub-Saharan Africa. *Rock Art Research: The Journal of the Australian Rock Art Research Association (AURA)*, 30(1), 33.
- Beilock, S. L., Gunderson, E. A., Ramirez, G., & Levine, S. C. (2010). Female teachers' math anxiety affects girls' math achievement. *Proceedings of the National Academy of Sciences*, 107(5), 1860-1863.
- Beilock, S. L. (2008). Math performance in stressful situations. *Current Directions in Psychological Science*, 17(5), 339-343.
- Bell, J., & Waters, S. (2018). *eBook: Doing your Research Project: A Guide for First-Time Researchers*. McGraw-Hill Education (UK).
- Betz, N. E., & Hackett, G. (1983). The relationship of mathematics self-efficacy expectations to the selection of science-based college majors. *Journal of Vocational Behavior*, 23(3), 329-345.
- Bhave, S. Y., & Saini, S. (2009). *Anger management*. SAGE Publications India. (Section two 1-70).
- Bibby, T. (2002). Shame: An emotional response to doing mathematics as an adult and a teacher. *British Educational Research Journal*, 28(5), 705-721.
- Blazer, C. (2011). Strategies for Reducing Math Anxiety. Information Capsule. Volume 1102. *Research Services, Miami-Dade County Public Schools*.
- Boaler, J. (2000). Mathematics from another world: Traditional communities and the alienation of learners. *The Journal of Mathematical Behavior*, 18(4), 379-397.
- Boaler, J. (2016). *Mathematical mindsets*. San Francisco, CA: Jossey - Bass.
- Boaler, J., Dieckmann, J. A., Pérez-Núñez, G., Sun, K. L., & Williams, C. (2018, April). Changing students minds and achievement in mathematics: the impact of a free online student course. *In Frontiers in Education* (Vol. 3, p. 26). Frontiers.
- Bryman, Alan. (2016). *Social research methods*. Oxford university press.
- Chronaki, A., & Kolloosche, D. (2019). Refusing mathematics: *A discourse theory approach on the politics of identity work*. *ZDM*, 51(3), 457-468.
- Devlin, K. (1998). *Life by the Numbers*. John Wiley & Sons Incorporated.
- Di Martino, P., & Zan, R. (2013). Where does fear of maths come from? Beyond the purely emotional. *In Congress of the European Society of Research in Mathematics Education* (pp. 1309-1318). Middle East Technical University.
- Dowker, A., Sarkar, A., & Looi, C. Y. (2016). Mathematics anxiety: What have we learned in 60 years? *Frontiers in Psychology*, 7, 508.
- Dunn, R. (1984). Learning style: State of the science. *Theory into practice*, 23(1), 10-19.

- Dweck, C. S. (2008). *Mindset: The new psychology of success*. Random House Digital, Inc..
- Ekman, P., & Cordaro, D. (2011). What is meant by calling emotions basic. *Emotion review*, 3(4), 364-370.
- Ferla, J., Valcke, M., & Cai, Y. (2009). Academic self-efficacy and academic self-concept: Reconsidering structural relationships. *Learning and individual differences*, 19(4), 499-505.
- Fotoples, R. M. (2000). In my view: Overcoming math anxiety. *Kappa Delta Pi Record*, 36(4), 149-151.
- Furedi, F. (2006). *Culture of fear revisited*. A&C Black.
- Furner, J. M., & Berman, B. T. (2003). Review of research: math anxiety: overcoming a major obstacle to the improvement of student math performance. *Childhood education*, 79(3), 170-174.
- Ganley, C. M., & McGraw, A. L. (2016). The development and validation of a revised version of the math anxiety scale for young children. *Frontiers in Psychology*, 7, 1181.
- Gemzøe Mikkelsen, E., & Einarsen, S. (2002). Relationships between exposure to bullying at work and psychological and psychosomatic health complaints: The role of state negative affectivity and generalized self-efficacy. *Scandinavian Journal of Psychology*, 43(5), 397-405.
- Grootenboer, P., Grootenboer, & Marshman, M. (2015). *Mathematics, affect and learning*. Springer Singapore.
- Grusec, J. E. (1994). *Social learning theory and developmental psychology: The legacies of Robert R. Sears and Albert Bandura*.
- Habberstad, S. (2019). *Hat for matematikk - En kartlegging av tre voksenes hat for matematikk*. Master's thesis. Kristiansand: University of Agder.
- Hilton, P., & Pedersen, J. (1980). Overcoming Math Anxiety.
- Hodges, H. L. (1983). Learning styles: Rx for mathophobia. *The Arithmetic Teacher*, 30(7), 17-20.
- Itter, D., & Meyers, N. (2017). Fear, Loathing and Ambivalence toward Learning and Teaching Mathematics: Preservice Teachers' Perspectives. *Mathematics Teacher Education and Development*, 19(2), 123-141.
- Jacob, S. A., & Furgerson, S. P. (2012). Writing interview protocols and conducting interviews: tips for students new to the field of qualitative research. *Qualitative Report*, 17, 6.
- Kerkeni, L., Serrestou, Y., Mbarki, M., Raoof, K., & Mahjoub, M. A. (2017, May). A review on speech emotion recognition: Case of pedagogical interaction in classroom. In *2017 International Conference on Advanced Technologies for Signal and Image Processing (ATSIP)* (pp. 1-7). IEEE.
- Klein, Donald C. "The humiliation dynamic: An overview." *Journal of Primary Prevention* 12.2 (1991): 93-121.
- Larkin, K., & Jorgensen, R. (2016). 'I Hate Maths: Why Do We Need to Do Maths?' Using iPad Video Diaries to Investigate Attitudes and Emotions Towards Mathematics in Year 3 and Year 6 Students. *International Journal of Science and Mathematics Education*, 14(5), 925-944.
- Li, Y., & Bates, T. C. (2019). You can't change your basic ability, but you work at things, and that's how we get hard things done: Testing the role of growth mindset on response to setbacks, educational attainment, and cognitive ability. *Journal of Experimental Psychology: General*, 148(9), 1640.
- McLeod, D. B. (2005). Research on affect in mathematics education: A reconceptualization. In D.A. Grouws (Ed.), *Handbook of Research on Mathematics Teaching and Learning* (pp. 575-597). Reston, VA: National Council of Teachers of Mathematics.

- Nabavi, R. T. (2012). Bandura's social learning theory & social cognitive learning theory. *Theory of Developmental Psychology*, 1-24.
- Neufeldt, V., & Guralnik, D. B. (1997). Webster's new world college dictionary. New York: McMillian.
- Pepin, B. (2011). *Pupils' attitudes towards mathematics: A Comparative Study of Norwegian and English Secondary Students*. *ZDM*, 43(4), 535-546.
- Philippou, G. N., & Christou, C. (1998). The effects of a preparatory mathematics program in changing prospective teachers' attitudes towards mathematics. *Educational studies in mathematics*, 35(2), 189-206.
- Pintrich, P. R. (2003). A motivational science perspective on the role of student motivation in learning and teaching contexts. *Journal of educational Psychology*, 95(4), 667.
- Prayoga, T., & Abraham, J. (2017). A psychological model explaining why we love or hate statistics. *Kasetsart Journal of Social Sciences*, 38(1), 1-8.
- Rempel, J. K., & Sutherland, S. (2016). *Hate: Theory and implications for intimate relationships*. In *The psychology of love and hate in intimate relationships* (pp. 105-129). Springer, Cham.
- Rempel, J. K., Burris, C. T., & Fathi, D. (2019). Hate: Evidence for a motivational conceptualization. *Motivation and emotion*, 43(1), 179-190.
- Richardson, F. C., & Suinn, R. M. (1972). The mathematics anxiety rating scale: psychometric data. *Journal of Counseling Psychology*, 19(6), 551.
- Scarpello, G. (2007). Helping students get past math anxiety. *Techniques: Connecting Education and Careers (J1)*, 82(6), 34-35.
- Scheff, T. J. (2000). Shame and the social bond: A sociological theory. *Sociological theory*, 18(1), 84-99.
- Schoonenboom, J., & Johnson, R. B. (2017). How to construct a mixed methods research design. *KZfSS Kölner Zeitschrift für Soziologie und Sozialpsychologie*, 69(2), 107-131.
- Schunk, D. H., & Ertmer, P. A. (2000). Self-regulation and academic learning: Self-efficacy enhancing interventions. In *Handbook of self-regulation* (pp. 631-649). Academic Press.
- Schunk, D. H., & Pajares, F. (2010). *Self-efficacy beliefs*, 668-672.
- Schwandt, T. A., Lincoln, Y. S., & Guba, E. G. (2007). Judging interpretations: But is it rigorous? Trustworthiness and authenticity in naturalistic evaluation. *New directions for evaluation*, 2007(114), 11-25.
- Schwarzer, R., Bäßler, J., Kwiatek, P., Schröder, K., & Zhang, J. X. (1997). The assessment of optimistic self-beliefs: comparison of the German, Spanish, and Chinese versions of the general self-efficacy scale. *Applied Psychology*, 46(1), 69-88.
- Silver, M., Conte, R., Miceli, M., & Poggi, I. (1986). Humiliation: Feeling, social control and the construction of identity. *Journal for the Theory of Social Behaviour*.
- Skaalvik, E. M., & Skaalvik, S. (2013). School goal structure: Associations with students' perceptions of their teachers as emotionally supportive, academic self-concept, intrinsic motivation, effort, and help-seeking behavior. *International Journal of Educational Research*, 61, 5-14.
- Spielberger, C. D. (2010). State-Trait anxiety inventory. *The Corsini encyclopedia of psychology*, 1-1.

- Spielberger, C. D., Gonzalez-Reigosa, F. E. R. N. A. N. D. O., Martinez-Urrutia, A. N. G. E. L., Natalicio, L., & Natalicio, D. S. (1971). Development of the Spanish edition of the state-trait anxiety inventory. *Interamerican Journal of Psychology*, 5(3-4), 145-158.
- Sternberg, R. J. (2003). A duplex theory of hate: Development and application to terrorism, massacres, and genocide. *Review of general psychology*, 7(3), 299-328.
- Stodolsky, S. S. (1988). *The subject matters: Classroom activity in math and social studies*. University of Chicago Press.
- Swan, P. (2004, December). I hate mathematics. *In MAV Annual Conference*.
- Tangney, J. P. E., & Fischer, K. W. (1995). Self-conscious emotions: The psychology of shame, guilt, embarrassment, and pride. In The idea for this volume grew out of 2 pivotal conferences. *The 1st conference, on emotion and cognition in development, was held in Winter Park, CO, Sum 1985. The 2nd conference, on shame and other self-conscious emotions, was held in Asilomar, CA, Dec 1988.* Guilford Press. (1-121)
- Tobias, S. (1987). *Succeed with Math: Every Student's Guide to Conquering Math Anxiety*. The College Board, Box 886, New York, NY 10101-0886.
- Tobias, S. (1990). Math anxiety: An update. *Nacada Journal*, 10(1), 47-50.
- Tobias, S. (1991). Math mental health: Going beyond math anxiety. *College Teaching*, 39(3), 91-93.
- UDIR (2020). *L:replan i matematikk 1.-10. trinn (MAT01-05)*. Oslo: UDIR. Retrieved 20.11.2010 from <https://www.udir.no/lk20/mat01-05>.
- van Teijlingen, E., Hundley, V. (2001) The importance of pilot studies. *Social Research Update*, 35.
- Vygotsky, L. S. (1978). Sociocultural theory. *Mind in society*, 6, 52-58.
- Wells, G. (1999). The zone of proximal development and its implications for learning and teaching. *Dialogic inquiry: Towards a sociocultural practice and theory of education*, 313-334.
- Yeo, D. (2008). *Dyslexia, dyspraxia and mathematics*. John Wiley & Sons.
- Zan, R., & Di Martino, P. (2007). Attitude toward mathematics: Overcoming the positive/negative dichotomy. *The Montana Mathematics Enthusiast*, 3(1), 157-168.

Appendix 1

a. Information Letter

Are you interested in taking part in the research project?

“Hate Math (Factor/causes for extreme disliking Mathematics)”?

This is an inquiry about participation in a research project where the main purpose is to investigate the people extreme negative behaviour and attitude towards mathematics. Which challenges a student's face during his student life which leads them to hate mathematics. In this letter we will give you information about the purpose of the project and what your participation will involve.

Purpose of the project

This is a master thesis research project where data will collect and use for educational purpose.

Through this study, we can better understand the negative attitudes of the people towards mathematics and prevent its negative attitudes from progressing further.

The purpose of this work is to try to find the motives behind mathematics aversion. Which of the following was the powerful motives for this emotion being created within them? These reasons have to be compared with people who still have hate for mathematics with those who don't have any more.

- How students learn to hate mathematics?
- Comparing Why this hate fade with the passage of time and why it is still there?

Who is responsible for the research project?

The University of Agder (Mathematical Department) is the institution responsible for the project. The researcher responsible is Sehrish Munawar (Master student) and the project is however supervised by Professor Pauline Vos.

Why are you being asked to participate?

You have been selected for this research work because you claimed you hate mathematics subject.

What does participation involve for you?

The data will be collected using four instruments General self-efficacy scale, Interview, Rempel list of hate and mathematic self-efficacy scale. The whole process can take one and half hour.

You as a participant take part in

- You have to give the answer of some statement from General Self-efficacy scale. 10 items are rated on a 4-point Likert scale ranging from (1) “Not at all true” to (4). which will take 5-8 minutes (List will be provide at that time).
- You will also participate in a 45–50-minute interview, where you will talk about your negative emotions by giving some answered. You have to share painful moments, person and things from your life which causes to develop negative emotions in you. Your answers will be recorded electronically.
- You have to select some statements from a list of Rempel which show your intensity of hate. This instrument will consume 10-12 minutes (List will be provide at that time).
- You also have to fill Mathematic self-efficacy scale which will take your 5-8 minutes. 8 Items are rated on a 4-point Likert scale ranging from (1) “Very confident” to (4) “Not at all confident” (List will be provide at that time).

Participation is voluntary

Participation in the project is voluntary. If you chose to participate, you can withdraw your consent at any time without giving a reason. All information about you will then be made anonymous. There will be no negative consequences for you if you chose not to participate or later decide to withdraw.

Your personal privacy – how we will store and use your personal data

We will only use your personal data for the purpose(s) specified in this information letter.

We will process your personal data confidentially and in accordance with data protection legislation (the General Data Protection Regulation and Personal Data Act).

- The only persons that can have access to the personal data are the researcher, supervisor and the censor at the University of Agder.
- All important and necessary measures will be taken to ensure that no unauthorized persons are able to access the personal dat., I will replace your name with some other name to ensure your identity will not revealed at any stage of the project.

The participants will not be recognized in any form publications. Their name will be changed but their age and occupation will be mentioned (if necessary, will be discussed in data analysis).

What will happen to your personal data at the end of the research project?

The project is scheduled to end on the 30 May 2021. The personal data, including voice recordings will completely deleted within six months after the six is done.

Your rights

So long as you can be identified in the collected data, you have the right to:

- access the personal data that is being processed about you
- request that your personal data is deleted
- request that incorrect personal data about you is corrected/rectified
- receive a copy of your personal data (data portability), and

- send a complaint to the Data Protection Officer or The Norwegian Data Protection Authority regarding the processing of your personal data

What gives us the right to process your personal data?

We will process your personal data based on your consent.

Based on an agreement the University of Agder (Mathematical Sciences Department), NSD – The Norwegian Centre for Research Data AS has assessed that the processing of personal data in this project is in accordance with data protection legislation.

Where can I find out more?

If you have questions about the project, or want to exercise your rights, contact:

- The University of Agder (Department of Mathematical Sciences) via
 - Pauline Vos (Supervisor), by email: pauline.vos@uia.no
 - Sehrish Munawar (Student), by email: Sehrishm@student.uia.no or by telephone: +4792983035
- NSD – The Norwegian Centre for Research Data AS, by email: personverntjenester@nsd.no or by telephone: +47 55 58 21 17.

Yours sincerely,

.....
Sehrish Munawar
(Researcher/student)

.....
Prof. Pauline Vos
(Supervisor)

Consent form

I have received and understood information about the project “hate mathematics” and have been given the opportunity to ask questions. I give consent:

- to participate in giving response a scale that is “general self-efficacy scale”.
- to participate in an interview 45-50 minutes.
- to participate in selecting statement from a list of hate.
- To participate in giving response a scale that is “mathematic self-efficacy scale”.

I give consent for my personal data to be processed until the end date of the project, approximately July 2021.

(Signed by participant, date)

b. Permission from NSD

6/21/2021

Meldeskjema for behandling av personopplysninger



NSD's assessment

Project title

Hate Math (Factor/causes for extreme disliking Mathematics)

Reference number

304968

Registered

04.08.2020 av Sehrish Munawar - sehrishm@student.uia.no

Data controller (institution responsible for the project)

Universitetet i Agder / Fakultet for teknologi og realfag / Institutt for matematiske fag

Project leader (academic employee/supervisor or PhD candidate)

Pauline Vos , PAULINE.VOS@UIA.NO, tlf: 4738142332

Type of project

Student project, Master's thesis

Contact information, student

Sehrish Munawar, sehrishmunawwar@gmail.com, tlf: 92983035

Project period

01.09.2020 - 15.12.2021

Status

11.06.2021 - Closed

Assessment (1)

17.08.2020 - Assessed

Our assessment is that the processing of personal data in this project will comply with data protection legislation, so long as it is carried out in accordance with what is documented in the Notification Form and attachments, dated 17 August 2020, as well as in correspondence with NSD. Everything is in place for the processing to begin.

NOTIFY CHANGES

If you intend to make changes to the processing of personal data in this project it may be necessary to notify NSD. This is done by updating the Notification Form. On our website we explain which changes must be notified. Wait until you receive an answer from us before you carry out the changes.

TYPE OF DATA AND DURATION

The project will be processing special categories of personal data about health, and general categories of personal data, until 30 May 2021.

LEGAL BASIS

The project will gain consent from data subjects to process their personal data. We find that consent will meet the necessary requirements under art. 4 (11) and 7, in that it will be a freely given, specific, informed and unambiguous statement or action, which will be documented and can be withdrawn.

The legal basis for processing special categories of personal data is therefore explicit consent given by the data subject, cf. the General Data Protection Regulation art. 6.1 a), cf. art. 9.2 a), cf. the Personal Data Act § 10, cf. § 9 (2).

PRINCIPLES RELATING TO PROCESSING PERSONAL DATA

NSD finds that the planned processing of personal data will be in accordance with the principles under the General Data Protection Regulation regarding:

- lawfulness, fairness and transparency (art. 5.1 a), in that data subjects will receive sufficient information about the processing and will give their consent
- purpose limitation (art. 5.1 b), in that personal data will be collected for specified, explicit and legitimate purposes, and will not be processed for new, incompatible purposes
- data minimisation (art. 5.1 c), in that only personal data which are adequate, relevant and necessary for the purpose of the project will be processed
- storage limitation (art. 5.1 e), in that personal data will not be stored for longer than is necessary to fulfil the project's purpose

THE RIGHTS OF DATA SUBJECTS

Data subjects will have the following rights in this project: transparency (art. 12), information (art. 13), access (art. 15), rectification (art. 16), erasure (art. 17), restriction of processing (art. 18), notification (art. 19), data portability (art. 20). These rights apply so long as the data subject can be identified in the collected data.

NSD finds that the information that will be given to data subjects about the processing of their personal data will meet the legal requirements for form and content, cf. art. 12.1 and art. 13.

We remind you that if a data subject contacts you about their rights, the data controller has a duty to reply within a month.

FOLLOW YOUR INSTITUTION'S GUIDELINES

NSD presupposes that the project will meet the requirements of accuracy (art. 5.1 d), integrity and confidentiality (art. 5.1 f) and security (art. 32) when processing personal data.

Zoom and Microsoft Skype are data processors for the project. NSD presupposes that the processing of personal data by a data processor meets the requirements under the General Data Protection Regulation arts. 28 and 29.

To ensure that these requirements are met you must follow your institution's internal guidelines and/or consult with your institution (i.e. the institution responsible for the project).

FOLLOW-UP OF THE PROJECT

NSD will follow up the progress of the project at the planned end date in order to determine whether the processing of personal data has been concluded.

Good luck with the project!

Contact person at NSD: Simon Gogl
Data Protection Services for Research: +47 55 58 21 17 (press 1)

Appendix 2 (Interview Protocol)

a. Introductory meeting

This meeting can be held digitally due to safety precautions.

A conversation to build confidence

- Introduce yourself, family friends
- Obtain information about their interest, hobbies, study skills
- How will you define yourself? Nature, response to things, etc.
- How your life in school and at home? (If they want to share)

Objective of the research

- Informal conversation about the contents and objectives of the research.
- Why is this hate in mathematics and how does it occur?
- The interview aims to identify the hatred the individuals possess and reflect on this hatred.

Consent form

- A letter of consent will be signed at the first informal meeting before the interview starts.

General Self-efficacy scale

- 10 Items are rated on a 4-point Likert scale ranging from (1) “Not at all true” to (4) “Exactly true” Schwarzer et., al (1997).

b. Interview guide

An interview guide or schedule has been well-planned and piloted, questions, items and headings will help not only to record participant responses but to remind you of what was said under each heading (Bell & Waters 2012). I will start my conversation with, I am here with you because you hate mathematics/ Once you have these strong feelings of hate in your life.

About Subject	<ul style="list-style-type: none"> • What is mathematics for you? • Do you think this is a different subject than others? • Do you hate the subject or is it hate all the time? • Do you see math as useful? • Feel you that you are not mathematic student? • Were you be humiliated in the classroom? • Do you feel that they are close to you? (favorite subject) • Can anything have to do with grades?
School environment and Teachers	<ul style="list-style-type: none"> • Hatred for the subject or the people of mathematics? <p>Cumulative structure, exam, pressure, amount?</p> <ul style="list-style-type: none"> • Did you hate your mathematics teacher? • Have you heard good or bad things about mathematics from the beginning?
Family Math	<ul style="list-style-type: none"> • How's your family perform in mathematics (Brother and sister)? • Did you get any help with math work? • Is there anyone near you who may have influenced your feelings?
Hate	<ul style="list-style-type: none"> • Why do you think this feeling is hatred? • How did you feel while working on math? • Feelings for inclusion/ exclusion
When, where starting these feeling	<ul style="list-style-type: none"> • When did you find yourself starting to hate math? (Starting Point) • How would you describe your hatred for the math's subject? • Did something significant happen then? • Did you ever try to change your thoughts or mindset?

Change in life	<ul style="list-style-type: none"> • After that, what has changed? • Do you think about mathematics more or less? • Do you have the same attitude now as before? (Behavior) • Are there any people who have influenced this? (try to change your thoughts)
Want to ruin and remove	<ul style="list-style-type: none"> • Have you sometimes wanted to ruin the math or removed the math subject? How about hurting the teacher? (Intimacy) • Whenever you get angry (Biter), how do you handle it? (Passion) • Did you learn to hate math, or it came by itself? (Commitment)
Closing	<ul style="list-style-type: none"> • Brief summary of the main features of the interview • Clearance if something is unclear. • Room for the participant to ask any questions or add information it wants to tell

c. Generalized Self- efficacy

10 Items are rated on a 4-point Likert scale ranging from (1) “Not at all True” to (4) “Exactly True” (Schwarzer et al., 1997).

Generalized Self- efficacy

Statements	Not at all True	Barely True	Moderately True	Exactly True
1. I can always manage to solve difficult problems if I try hard enough.				
2. If someone opposes me. I can find means and ways to get what I want.				
3. It is easy for me to stick to my aims and accomplish my goals.				
4. I am confident that I could deal efficiently with unexpected events				
5. Thanks to my resourcefulness, I know how to handle unforeseen situations.				
6. I can solve most problems if I invest the necessary effort.				
7. I can remain calm when facing difficulties because I can rely on my coping abilities.				
8. When I am confronted with a problem, I can usually find several solutions.				
9. If I am in a bind, I can usually think of something to do.				
10. No matter what comes my way, I’m usually able to handle it.				

Rating Scale

1 = Not at all true 2 = Hardly true 3 = Moderately true 4 = Exactly true

d. Math self-efficacy scale

8 Items are rated on a 4-point Likert scale ranging from (1) “Very confident” to (4) “Not at all confident” (Ferla et., al 2009).

Math self-efficacy scale

Statements	Very confident	Confident	Less confident	Not all confident
1. Using a train timetable to work out how long it would take to get from one place to another				
2. Calculating how much cheaper a TV would be after a 30% discount.				
3. Calculating how many square meters of tiles you need to cover a floor.				
4. Understanding graphs presented in newspapers				
5. Solving an equation like $3x+5=17$				
6. Finding the actual distance between two places on a map with a 1:10,000 scale.				
7. Solving an equation like $2(x+3)=(x+3)(x-3)$				
8. Calculating the petrol consumption rate of a car.				

Rating Scale

1 = Very Confident 2 = Confident 3 = Less confident 4 = Not at all confident

e. Select from the List

After the interview participants have to choose the statement which is close to their feelings of hate toward mathematic (Rempel 2019).

Statements

Choose the statement which fits with your feeling of hate towards mathematics.

Items no	Words/ Statements	
1	Absence of love	
2	Acting maliciously towards the target	
3	Desire to destroy	
4	Desire to bring down the target	
5	Absence of positive emotion	
6	Wishing for the target not to exist	
7	Stronger than dislike	
8	Destructive emotion	
9	Fear	
10	Extreme disliking	
11	Aversion	
12	Detesting	
13	Thoughts of murder	
14	Wishing death upon the target	
15	Embarrassment	
16	Jealousy	
17	Absence of sympathy	
18	Wanting to eliminate the target from your life	
19	Motive develops toward the target	
20	Agitation	
21	Loathing	
22	Wanting to exclude the target from your life	
23	Washing harm upon the target	
24	Discounting another person for qualities you dislike about him or her	
25	Repulsion	
26	Discrimination, prejudice or racism	
27	Desire to make the target's life miserable	
28	Strong emotion that creates the desire to harm	
29	Premeditated acts of violence and abuse	
30		
31	Anger	
32	Opposite of love	
33	Irritation	
34	Desire to kill	
35	Frustration	

36	Lack of understanding	
37	Disgust	
38	Intense anger	
39	Sadistic malevolent sentiment	
40	Gratification from negative circumstances occurring to the target	
41	Lack of forgiveness	
42	Hostility	
43	Negative built-up emotion	
44	Strong negative feeling	
45	Distrust	
46	Desire to hurt	
47	Severe discomfort	
48	Extreme emotion	
49	Despising	
50	Ignorance	
51	To stop seeing someone on a person	
52	Abuse	

Appendix 3 (Transcripts)

Group 1

Ali

Me: Kindly introduce yourself.

Ali: I am originally from Asia. I was born in a village and raised in a big city with lots of facilities. I am 26 years old and a computer science graduate. I was doing job in a software house and vice leader of team web development. Now I left the software house job because I have my final year project, which is very time-consuming. I had not timed for a job, so I left it. My future goal is to be a Cyber Security Expert and INSHA ALLAH one day I will be.

Me: I wanted to look in your school memories when you were learning mathematics; what was mathematics for you at that time?

Ali: So, when I was in school, I loved every subject except mathematics. The only subject which the cause of bunk is off. Sometimes, I thought how life was so peaceful if the math doesn't exist. I was so gone through in my imaginations, and I feel so relaxed until my imagination didn't break.

Me: Why you still hate mathematics while you are not learning it now?

Ali: As I heard that death would never leave your back. So, that kind of situation is with math. I still have mathematics in my life. Math does not want to leave my back; it has some kind of strong bond with me.

Me: Which kind of bond?

Ali: Unhealthy, unhappy.

Me: If it is still in your life, how is your struggling with it going?

Ali: yeah, it was in my life 2 Years ago and I really had these days tough when it was in my life. Now Thank GOD this Alien language is no more in my life for now. I am thinking about my master's in cyber security expert, so no idea I will be face maths there.

Me: Why do you think this feeling is hatred? (Why are you claiming this is hate)?

Ali: I have been teased my whole life by mathematics, so when someone speaks the name of mathematics in front of me, I get a headache at that moment on the spot. So, I am angry with mathematics.

Me: Why???

Ali: Why????? Because I told you I hate mathematics; this mathematics is out of my thinking range. No matter how much I tried, I can't learn mathematics and now I don't want to.

Me: Which types of feelings did you have while working with a mathematics task?

Ali: As I mentioned above, I have angered with mathematics as well as disappointment. I curse myself I started degrading myself at that time. I start blubbering with myself that I am so dumb that I cannot solve the mathematics task; what I will do in the future? What I will do else if I can't do that much.

Me: When you became disappointed, are you able to focus on other subjects or not? How had you overcome these feelings?

Ali: I then worked hard because I thought, what if I could not learn mathematics, I would make myself good in another language, so in other subjects, I am not so good, but yeah, I am average.

Me: How did you feel while working on maths?

Ali: Totally uncomfortable I wish this person died earlier while he was inventing/discovering mathematics, whatever. I don't want to abuse him; I think that's enough.

Me: When did you find yourself starting to hate mathematics?

Ali: I think it was in class 6th in which I realized. There is a little story behind it that I can't tell right now. The conversation will be gone so long. So yeah, this was class 6th.

Me: It's okay, if you shared, I would not force you but if you do, it will help me.

Ali: Okay, let me tell you

I was the monitor of my class and Proctor from KG1 to 8th. I was the favorite student of all of my teachers ALHAMDOLELAH. I was an innocent student. That's why teachers loved me and still love me even I passed out from that school in 2010.

We are a class of more than 50 students. Sometimes our teachers need student help to manage things. So, the story is that when I was in class 6th, our teacher asked for help from two guys. The one is me, and then another was 1st position holder, so we were checking the papers with our teacher. Where I know that I was securing 1st position holder these times, and I was so happy. My sir was giving me a little smile. I didn't know that this happiness will be for only few minutes so as my teacher checked the maths paper again. He crossed me so easily that he became the first position and I got 2nd position. Now sir stares at me and says Ali, what happened?? I replied to sir, I don't know. I really don't know what happened but through this, sir wanted to realize that I should work on my mathematics, I don't know why? He knew in every class I got 1st position, but he beats me in his Mathematics class.

After, result day my teacher called my father. No doubt Ali is a good student, but he is very weak in mathematics. Kindly make him good in it every year he gets the first position but the cause of having weak math skills placed him in 2nd position. My father came home and told me everything which the teacher told my father. So, that day, I realized I was able to get 1st position, but this mathematics doesn't let me to.

Me: Did anything significant happen?

Ali: Yeah, as I told you a story, there is a little story behind it.

Me: When you realize you dislike mathematics and this disliking turned into hate? (Any event, or point if you remember)?

Ali: Due to bad experiences and teacher nature, I have many painful moments. In my second year, our math teacher took the quiz in math, so the result came every student got 19/20, 18/20. The only innocent guy, who got 2/20, was me. So, at that time, personally was living alone in a hostel. I was so upset the whole day me spent in sadness. The pain was increasing, and this thinking was killing me. I tried to sleep but I couldn't. I personally start crying, run out of the room. I only start running on the road and crying so hard and shouting. I spent my whole night on the road. By that, my disliking turned into hate.

Me: Have you been humiliated while getting the grades from your teachers? (Humiliated by your friends and teachers)?

Ali: Yeah, always in my school, I made up Murghaa in front of girls UFF when I think about these days; it feels like this humiliation is still happening to me.

Me: Did you try to change your mindset? That no mathematics is useful I must try to learn?

Ali: Yes, I tried many times and worked on it so hard, but the thing I get in result only was a disappointment. The Scene between me and math is just like that, “two of a trade seldom agree”.

Me: Anybody tried to help you to change your mindset?

Ali: Not math is not my wife that someone will jumps into our relationships and try to fix everything. I am not always talking about mathematics hate whenever I face mathematics hate. So, I just tell you that much that I am weak at math that's it, but I really hate it.

Me: This hatred for the mathematics subject or the people for mathematics?

Ali: I think the cause of my hate is my schoolteacher. My base wasn't made.

Me: So, mathematics language and its content were not challenging for you? It is teacher.

Ali: Yeah, in my opinion, it is something like that because the teacher makes 'their students,' base, not students on their own. Maybe, due to teachers, I am not good at it. Otherwise, I am very capable.

Me: Where you found the problem in mathematics? (Which part of the mathematics was a great challenge for you)?

Ali: Excuse me? Just ask me where the problem that I shouldn't face I am faced/face/facing the problem in math everywhere. The seconds name of problem in Mathematics. If you focused on the word “PROBLEM” that exists in mathematics, I mean the “Problems questions”.

Me: Are you afraid to raise your hand or to solve problems on the board? If not, why? Which feeling you have at that time?

Ali: I think what people will think about me if I didn't solve out the problems because I don't know even the Minus (negative) plus (addition) of mathematics, so I never tried even never thought of it to raise the hand. I am not that much stupid to raise a hand and insult myself.

Me: Why were you not good in basic mathematics?

Ali: I still didn't find out that what the reason is. I picked up every subject at some level but in mathematics, I am totally failed. So maybe the reason is my base that is didn't make or my teachers.

Me: If you are not doing well in mathematics, what were your teachers' responses? (How were you treated?)

Ali: As always, they were beaten by sticks, or they were becoming angry with me and scolded. That's all they could do.

Me: What about your classmates?

Ali: The classmates of my school-time all were like me except one boy who was the first position holder of our class.

Me: Don't you think your fellow influenced your thoughts?

Ali: I tried a lot. I started to go to academy I practiced in my home. I tried a lot, so the result was not much appreciated.

Me: What your friends used to say about mathematics?

Ali: They haven't said anything but whenever I had asked them in a quiz or the paper in a cause of getting hint or clue (cheating). Then they say they were also struggling, but they got good marks.

Me: Are you not interested in learning mathematics?

Ali: Absolutely not. I am very angry with mathematics, and I have no interest in listening, talking, and developing any relation with it for the rest of my life.

Me: How is it affecting your life now?

Ali: Well, what I can say now, when it didn't affect my life math always pestering me. Once I was sleeping math came into my dream and said I will always be pestering you. Oh! This was in a scary way. Basically, he/she just wanted to be scaring me.

Me: Anyone who influenced your life in a good or bad way?

Ali: The first Position holder of our class in both ways. In a good way, he influenced my lifelike. I had thought at that time, it could be me. This thought always teased me why it was not like him and I wish I became like him. And in a bad way, I hate him too by knowing math, having a sharp mind in mathematics.

Me: You have a good relationship with this boy. Have you ever asked him to help you to understand mathematics concept?

Ali: Yeah, he is my friend, but our ways were separated when we passed out of school in 2010. And he is a job or gangster-like this and now he left the study after FSC.

Me: While working on the mathematics task, what did you felt?

Ali: While working on a mathematics task, I get a fever of 104.

Me: Dislike or hating mathematics changed things? How did things change?

Ali: When the talk comes of mathematics homework, I become totally crazy. I start abusing in my mind to everyone. The students who came to class with completed homework and sometimes to the teacher that why teacher gave homework.

Me: They (siblings or friends, parents) didn't try to help you solve your mathematics confusion and clear concepts?

Ali: here is one thing the math has issue's not only with me but also with my family too. There is no one in my family that he or she loves math. The hate with a math is given to us an inheritance. Friends did but when I was asking them that why $(a + b)^2 = a^2 + b^2 + 2 ab$? Then, they were getting angry that this is the rules, you follow the steps. So, I have only realized it that it is the rule.

Me: Did you hate your mathematics teacher?

Ali: Always when they were giving homework or taking the class of Mathematics.

Me: Is it the hate for one teacher or the entire Mathematics teacher?

Ali: No, I do not hate my teacher, but I am disappointed little bit by them.

Me: Do you think this is a different subject than others? How?

Ali: Of course, this totally different subject. The other subjects are written in human language, and this is the only subject which I think is written by Jinnaat. The People who understand mathematics are just like Jinnaat (Jinn) material.

Me: Every subject has its own language. So, you are totally unable to understand mathematics language. (Who is responsible for this?)

Ali: Yeah, mathematics is the language of supernatural things.

Me: What is your favorite subject? Why did you like it most?

Ali: The subjects which I like the most English and biology.

Me: Why do you like these?

Ali: Because I have a grip on these subjects as well as these are interesting subjects and, in my school-time my English and bio teachers were so good at teaching, I really liked their teaching way. Maybe teachers or my may be content both were fine.

Me: Were you humiliated (beaten, insults, torched, etc.) in the class?

Ali: In the time of school, often I have been beaten every day in math class. The math teacher as always making me “murgha” (This is the stress position used for punishment and is common in Asia. In this punishment person has to Squat and loop the arms behind the knees to grip the ears).

Me: Any other corporal punishment?

Ali: No, I think there is no other hard punishment than being murghaa in front of girls, beaten by a stick. All these things happened in front of girls that were more painful, which cannot be described.

Me: Are you a confident student?

Ali: ALHAMDO LELAH I am. I don't care about someone if one person is wrong. I tell him directly that you are wrong no matter who this person is and the outcomes. On behalf of my boldness in graduation, I am the CR of my class and the chief students at software house as well.

Me: Do you have the same attitude now or before?

Ali: Yeah, I think I am an egomaniac and seriously, I tried to change myself, but I didn't succeed in that and gave up now.

Me: If you get a chance, what way will you choose to destroy the mathematics from the world?

Ali: if I get a chance, I will undo the person who invents the mathematics that he could never invent it again.

Me: Have you thought to kill your Mathematics teacher? If yes how?

Ali: no, I am not that bad student or kill them yeah, but I abused my teacher in my mind and feel bad in my heart for him.

Me: Whenever you get angry, frustrated, any negative emotions, how you handle your feelings?

Ali: I worked on but no changes; once I get angry, I can't control myself. I spit out whatever comes out from my mouth.

Me: How confident are you in other subjects and Mathematics class?

Ali: ALHAMDO LELAH I am confident about myself in other subjects, but at Mathematics, I am zero.

Me: How's your school environment? Is it formal?

Ali: Yeah, in that time was totally normal now I am graduated. The environment of nowadays I can't say anything about it.

Me: What about the classroom environment?

Ali: The classroom was also Normal. But sometimes few boys and girls were become selfish in greediness to get 1st position, so they weren't helping.

Me: You didn't share about your family?

Ali: I just say about my family. Our whole family is against maths. The hate is given us in inheritance for maths.

Me: Do you want to add something I didn't ask, and you thought I should be added?

Ali: I think you should decrease the number of questions.

Anashe

Me: Introduce yourself.

Anashe: I am Mom, mom of three, and PhD candidate, and my research area is an urban redevelopment. I am pursuing my PhD in peace and conflict studies, where I am researching for development. When I go back to maths, I don't start to hate it overnight, and it started with my struggling. I hate it because I am struggling very hard as compared to other subjects. I will be getting high marks in other subjects and maths class is completely the opposite. I just disappear in the background; I can't figure out how it works. It is like the super thing like a fraction in grade three. When everybody is doing it right and I could not get it. I felt very bad when I got A in geography and got C in maths. It's like a bump for me a hard bump and I look forward to getting back. At least I didn't fail; I was on the borderline and can go with it.

Me: What comes in your mind when you hear the word mathematics now?

Anashe: It has gone that I struggled with hard, and I feel a fear for mathematics. When I see numbers, any numbers could be large it's like a phobia where my heart race. And I just go blank, and I said myself, okay, I can live without numbers. I can manage to do shop that's what I need. I put numbers aside and can live without it, but I don't like it at the back of my mind.

Me: I wanted to look in your background. Why do you think this feeling is hatred?

Anashe: I define my feelings as hate because I don't have any kind words for this. I don't have space for it in my life. I am doing research that required me to do mathematics. I went back to my supervisor (I had to do some quantitative stuff) to request purely qualitative because as I get the quantitative stuff, everything jams. I tried to find some people to help me to go past that. But something I still jam, and I struggle, I really don't need this guy. If math

is a person, I don't need that person in my life. I need to go about a speed bump bad speed bump and don't need it.

Me: How is this subject different from other subjects?

Anashe: I am not able to sort of apply myself fully. I cannot even solve any maths problem. If you give me any other subject like humanities, I solve it and defend it with arguments. I cannot do with math because I have no idea. It's the way I feel like, you cannot say anything. My son, when he was in grade 5, tried to teach me maths. He said, mom imagine you are a dull student, and I am the teacher. He was doing long division I still have a picture somewhere of it, and I was clueless; I didn't understand what this kid was saying.

Me: Where you found the problem in learning mathematics?

Anashe: The problem could be that I went to a rural school and most of the time maths was in the afternoon. It's hot and dry it's the worst time of the day. I really would have appreciated that the subject is put early in the morning at eight O'clock when it's cooled. I sit at a 38-degree temperature in the afternoon, feeling dozy with an empty stomach and trying to figure out mathematics problems. That was the situation in my primary school it was hot, and maths was at the wrong possible time on the timetable? When I was physically tired and hungry and want to go back home.

Me: Do you have the same routine throughout your schooling?

Anashe: It was the same from grade 1 to 7 and the next four years, I went to boarding school. It was still the same area, and the climate was hot. I don't remember this one. Our school hours were around 7- 8 hours. But I really didn't appreciate doing mathematics in the afternoon.

Me: Hows your school environment and teachers?

Anashe: My teachers were very good. My O level teacher was very good. He is so impressive. My first time when I was writings maths, I got D, but I was so positive that at least I got it. During my A level, I had to repeat math because I didn't need a D to get into the university. I don't need this D; I need a C in O level to enter the university. So, I asked the O level teacher to join his class because I was really blank, I wouldn't remember anything. I was so sad, I needed C, and I got D oh God. I went into the class, and the way he was teaching, simplifying, and explaining the things was good and I got C and I was really very happy. I was so happy (showing her happiness in expression as well). English and mathematics were compulsory to get into university. I did well in my A level, but I needed a C to further my O level.

In our education system, English and mathematics are compulsory up to O level (Form 4). You can drop math after two, but whatever you do will require math. But you can drop it after forms 2, but you can't avoid doing it unless you know you will do pure art at university. If you are going to teacher training, math was not necessary in the past, but now they want mathematics. Those who trained are now forced to sit for maths, and they are continuously evaluated for maths. There are different math subjects offered by if you are not good like me, opted for math. You have to do core maths even though you are not good, but you are supposed to do it now.

To get admission at any college, you need five compulsory subjects English, maths and three other subjects. These are the compulsory subjects you must depend on these you want to do further. If you need to go geography, nursing, or Biology, maths is compulsory, and I don't like it.

Me: How were you doing in basic mathematics?

Anashe: Here we have very good teachers, so the basics were laid properly. My classmates were very good at mathematics, that why I am saying the teachers were good. I was different, and I could bite this guy in all other subjects I come first but not mathematics. My performance was average, a student helping me to understand because I really don't need it. I am good at basic math and simple can-do things. But is then getting too complicated things, when you talk about real maths stuff, I said haha. (Laughing)

Me: Were you good at getting grades?

Anashe: I really don't remember, but I was average.

Me: Are you afraid to raise your hand or to solve problems on the board? If not, why? Which feeling you have at that time?

Anashe: I was hesitant to raise my hand back then and really hated solving problems on the board. I always stood my ground and told the teacher I don't know.

Me: As you said, your teachers were good at mathematics. They didn't give you extra help in learning mathematics.

Anashe: I don't remember any extra work you are just doing it and re do it. You can ask your friends for corrections. There was no such facility. You have a teacher who teaches more than 30 40 kids with no assistance. There was no facility for extra lessons.

Me: If you are not doing good mathematics, what's your teachers' and your family's response?

Anashe: I don't think anyone cared really. This whole thing is a flashback for me because this whole thing from grade 1 to 7, I am just exchanging the numbers for the other guy. If I didn't get the position 1 in the class, the other guy got 1, and I was on position 2. People just look at the fact that I was doing well. They didn't see the maths.

Me: Were you humiliated in the class by your teachers?

Anashe: No, I don't remember being humiliated in the classroom by the teachers. I think they all knew that I am doing well in other subjects. Because I don't remember any of my teachers saying that I am struggling. I didn't ask to help that I am struggling with from the teacher, that I need your help. No one was bothered about the low grades in math, maybe because I was a bright child in other subjects.

Me: What about your classmates?

Anashe: I had very good class fellows. A guy (who has passed now) we used to sit in the afternoon sit around him, so he can teach us maths, pass exams, and do our homework.

Me: What about your confidence in the mathematics classroom?

Anashe: I wasn't confident. One in a while, when the top is easy, I would participate but not that it bothered me. as I knew I was back of the pack anyway.

Me: What was your favorite subject?

Anashe: My favorite subject was geography. I was able to visualize the things I can travel in my mind. I could visualize a volcano, folds, faulting, and landscapes. Even now, I don't have a problem I can easily pick features from my GPS and visualize them on my GPS's physical area.

Me: If you are good at visualizing, then mathematics is also about abstract thinking.

Anashe: Yeah, to think in your mind you should have to understand the core. So, I think it's my failure to get to that level of visualizing in maths. For me, it is only numbers.

Me: What is the think in mathematics you hate the most?

Anashe: First, there was nothing wrong with my teachers. I really appreciated what they did. I have taught before, and I know when a student is struggling. You have a class with different students on different levels. You have to try to move them all along. I am suffering from homeschooling now. I have to teach my daughter and I wait for my husband when he comes from work to teach her maths. Otherwise, we will kill each other because I don't know what's happening there (maths work).

Me: So, you are not interested in learning mathematics or in changing your opinion about mathematics?

Anashe: I am interested in learning mathematics. I laugh with my kids that I will finish my Ph.D. and I need to go back to do maths again. Just to see how it's going to be like now when I am older. Maybe now I have more patience. I want to see how I really want to do it. I told them I need to do it myself because I affected by the mathematics subjects and the subject that involves numbers in it. When I see anything with math in it, I just block it and tell myself I will come back to it some other time and I never do. I like to be blocked this. Blocked is something that if I have something to eat that I don't like, I will come back to eat some other time and I never come to eat.

Me: Have you heard any good or bad things about mathematics in your surroundings?

Anashe: No, it's not from my surroundings. It's my personal experience. I struggle to learn mathematics. I haven't heard anything bad about maths in my surroundings, it's a good subject, but many people are affected/hindered by its difficulty. My son my kids are very good at mathematics. My man is also very good, so when we are sitting at a table, I am the only one who is clueless. Can you imagine how it feels? when everybody is discussing and laughing, I even don't know. They are putting jokes on mathematics, and I am sitting there and losing out.

Me: How you felt at that time did you like to share your feelings more?

Anashe: Nothing, I just keep quiet, and I am happy that I don't have kids like me who don't know mathematics. Apart from one of my kid's he hates geography and I hate mathematics. We are just opposite each other.

Me: What about your siblings and parents?

Anashe: They were average and even understood mathematics. I am the worst in the package. They have a better understanding.

Me: They didn't try to help you to solve your mathematics confusion and clearing concepts?

Anashe: No, I think my eldest brother, who is good at the arts. He had a problem with mathematics, and I believe he drops his mathematics at O level. My Mom was a full-time Mom, and a village mom went to school up to grade 3. She was very bright, and she couldn't continue; she had to get married. Just telling the truth, there was no time for her to help me with homework due to the chores. My dad had a job as a clerk, he came late and was also tired after work, and he wanted to take rest. He took the time to check out what we were doing. I remember in my earlier grade 1, and he taught me 1+1 and all in the evenings. I even

could see all these things in my head. My dad always has a checked on us, but my mom couldn't, although she was good at maths. Even today, she is perfect and intelligent with numbers and mathematics, and my brothers are also good at maths even now.

Me: It means you pass your exam on your own you didn't get extra help?

Anashe: I just got it from other kids or working in groups and discussion. We don't have such opportunities, and we didn't get them.

Me: Do you ever think that you are not a mathematics student?

Anashe: Yes, I always feel that mathematics is not for me, and I am stupid and cannot do mathematics. As I said that I don't have any kind words for mathematics. Maths is for me like an ahh, I should brush it off from my life. I can give you any excuse not to do it. I tried to move on from knowing that every bit of my life is affected by maths because it touched every field. It touches every bit of my life and it's something that, even when I come across, it continues to affect my life when I have to teach my kids.

Me: How is it affecting your life?

Anashe: There are things I need to analyze documents for that need to look for mathematics. I have developed that attitude that even I look at them, I never know. If I look at a table or graph with the number, it can't choose the trends what is the trend here. I will just look at it and won't give it a second thought. Even if I'm analyzing a research paper, I will skip it and look for what I want. That's how entrenched the problem is.

Me: What do you think about yourself while working with maths?

Anashe: I was frustrated, and I am not for mathematics at that time. I was more frustrated that I can't get it and people around you were getting it. All of my friends are getting it, but I can't. I have always been full of confidence, and nothing could drown me. Even though I was trying to drown it says no, I am not for maths and I don't have a problem. I have tried to find the problem, read about mathematics problems, and the theories and myths. The one that says if a baby skips and starts walking without ever crawling will have a problem with maths. I believe it because I did not crawl as a baby. Like me in mathematics and my mother also said, I didn't crawl, and she told me that before even I knew it before it knew of this correlationI believe that I didn't crawl, and I find myself with problems. No matter how I try to ask people to help me try, now my brain can't absorb it. My husband is a very good mathematician.

Me: When you start disliking mathematics, and this disliking turn to hate?

Anashe: Around grade 5, I realized that we are not meant for each other. I really don't like this subject and this subject is not easy for me. Feelings started to shape up in grade 5. As my feelings shaping up, I realized my teacher was good and explaining very well, but I was still living with the frustration of not getting it.

I had to do it because it was compulsory (not hate). My O level teacher was also good and trained in Russia. Everybody wants to go to his class because of the way he taught and explains the things. I couldn't get anything. When I eventually passed math, I was like humph, and I was done, I don't want to see this thing again. Ohh: I am dying I really don't want to see this thing. When you go to university and come across quantitative analysis for business statistics Oh God, it is still there, I hate it (laughs).

Me: Is anything significant happened in your life related to mathematics.

Anashe: No, I don't remember that anything happens in my life I just don't understand mathematics.

Me: Did you ever try to change your mindset that no, I have to work hard?

Anashe: No, I didn't ever try to change my mind. It was for me it was long dawned of saying, Lord, when I will get out of this. Oh God, when you let me out of these.

Me: Dislike or hating mathematics changed things? (Not liking to go to school, fear not completing homework)

Anashe: No, as I said, I was a bright student in my class; Maths didn't dampen my mood. In our village, when the bell rang, I was running to the school 1st bell, 2nd bell and the third bell I was in school. So, it didn't dampen my mood. I was right in all other subjects and average in maths.

Me: Now we have grown up how will you define your attitude now?

Anashe: Now it would be different. If I go back, I should have gone to my teachers and ask for help to explain the things to understood when everybody around me understood. I could be the same level as everybody. I often called it "Phobia". I define my phobia as, the moment I see any paper with numbers and problems – I completely shut it and put it aside. I even don't want to look at it a second time. I even don't try to know what these numbers are saying. The moment I try to look at it, all the emotions come into it. That I don't know it, I cannot understand and solve it and it's not for me. So, I put it aside. it like I will come back to it, and I don't want to go back.

Me: Anyone who influenced your life in a good or bad way?

Anashe: No, in a bad way, no one, in a good way, my husband tries. At first, he didn't think it was a problem. Now he knows that I actually have a severe problem with maths. He knows that I don't understand its language, and he wants to explain it in better way. He slows down and always starts with a sentence to comfort me; see, it is very simple; it should not frustrate you. He will sit and talk on his own, and I pretend I am listening; I won't hear anything that he said. My son also tried and said, don't be frustrated. I know you don't know maths don't be angry it is easy.

Me: While working on a mathematics task, what did you felt?

Anashe: I never felt embarrassed but frustrated, angry, and eventually, it comes into fear and anger. I was afraid of being failed; I was trying very hard and still get the wrong answers. How can I get the right answers with the wrong formula? I was not good at graph work, in the exam when everybody around me asked for graph paper, and I have no idea what to do with this paper. I went into a panic mood. I didn't ask for the graph paper, so you could imagine I feared that I would fail. Then exams results come out, and it was a headache. Now this fear has gone to become a phobia, fear for numbers. Phobia of numbers, it districts my day, I could be a bright day but became gloomy. I know I failed to understand and even don't want to read numbers, which means I am missing something in my research work.

Me: How you handle or express your feelings?

Anashe: Though I need mathematics every day, I comfort myself by saying that I don't need it; if I come across it and I avoid it. For me, it's a success that I can't do it and didn't understand. I don't know the things I misbehaved; I never throw tantrums. First of all, we brought up to behave you but deep inside, I wanted to explode. I wished someone come and talk to me and I want to explode. You cannot say anything to someone

because you will be expelled from school you have to behave well at home as well. You can't do anything wrong with African moms. They just give you a look, you know you have to behave, and you got your right way. It was accumulation I remember I was feeling dizzy due to hot weather. When you go back home you don't have time to study, it's the time to do house chores. I thought I failed to get answers, to pass exam and I have to start properly. There was an accumulation of anger, but I don't remember to flush it out.

Me: If you get a chance, what way will you choose to destroy the mathematics from the world?

Anashe: I don't want to kill it. After finishing my Ph.D, I will try to do mathematics for fun. I am a very forgiving person, so I forgive maths and understand why and enjoy it. I want to be part of the enjoyment. I don't use hate words too much in my life, and I discourage my kids from using this because it is very strong. It also because you have to give room to forgiveness, they have to forgive. Therefore, I said to forgive maths, although I hate it. Now I don't have a relationship with maths like before, so I forgive maths.

Me: What about mathematics usefulness?

Anashe: It was very useful. It comes to all parts of my life, even though I avoid it. It is useful in day-to-day life we are doing. We are calculating somehow.

Me: Do you want to add something?

Anashe: I can add anything in humanities, but I don't know what to add with maths. It's the first time I'm discussing my emotions but in maths, I don't know what to add... Discussing my feelings eventually, I thought I was the only person with the maths problem in the world because everybody around me understands at all, and I was alone with my feelings. I didn't share my feelings with my friends. I just discussed the hard facts that it is difficult for me. People start giving their arguments and ideas, and they just encouraged me. I just follow them, but I don't find it funny and can't make and enjoy jokes. I have a friend who loves budgeting and planning for everything, and when I'm travelling, I will ask her to go budgeting for me. Unfortunately, I do not share the same love for maths, I don't enjoy it, and I don't find it funny.

Hajara

Me: share something about yourself.

Hajara: I am an independent research scholar and book writer looking forward to completing a Ph.D. in media studied. I am researching psychology, international relations, political science, and media. I am also working as a freelancer.

Me: How was your journey with mathematics?

Hajara: The journey of my mathematics has not been so good. I was a brilliant, talkative, and overconfident student. I am the kind of person who used to score 95% 96% in other subjects but not in mathematics. I have been the highest score holder in my class. I don't know what the major problem was with mathematics, but I was unable to solve mathematics problems, manipulate equations even simple equations created great trouble for me. Whenever I had a question, I cannot understand the idea behind it, maybe because I am never interested in mathematics or perhaps because I have been another kind of student who used to be more interested in social issues.

It is also possible that I am the kind of person who is the fond of things like music, artistic things; it can be a reason to hate. Before using this word, I must say, I always try my best to understand it and put my efforts to get grasp in it like other subjects. For me, mathematics is essential, and you must solve its problems to obtain marks. I have never been able to find out how to x move towards y and join figures to obtain the answer. I was always confused despite my least effort to solve problems, mostly in algebra and geometry. I could not find the logic behind these terms. Later, I was determined that I am not a mathematics person. There can be many other things, but I don't think about them.

Me: What you thought when you look back on your past

Hajara: Today, when I look back, I have nothing relating to mathematics subject in my mind but mighty powers to manipulate and manipulate and solve the questions.

Up to my 10 grades, I was confused about what I am going to do. In my exam, all I did was, memorize all the questions, equations, and everything. When questions came, I remembered everything in my mind; I just copied each and everything because I have a sharp memory. It was horrible. I always realized that I am not a mathematics and physics person. I can go with my career with biology and maybe chemistry, but mathematics, physics, and statistics are different things for me. The worst experience was on 22 or 23 December. I was in 9 standards. My teacher told me that she would distribute the test, and I knew I could not pass the exam because I was totally unprepared for this. It was a surprising test. Nothing bad happened to expect. I scored 2/10. At least I have scored two, but my teacher asked nothing. She took my hands and snatched the wooden duster. The teacher said I would hit you ten times. I said, okay, I don't care; it's just punishment, do whatever you want. This was the first and the last I got punishment as a mathematics student.

Later I always tried to avoid opting for mathematics, not even statistics. Even today, when I am working as a researcher, I am trying to stay away from mathematics. Still, thanks to someone who invented statistics software like Spss, smart PLS, and many others, the thing became easier now. You enter the data and get the results out, and you just manipulate and narrate that data. Otherwise, I would not have been able to become a researcher.

Me: What is mathematics for you?

Hajara: A complex goal to achieve, something I should avoid no matter how important it is. Something that is not understandable for everyone. I am not made for mathematics; I am made for other things. Sometimes, I took it as a challenge and try hard to learn it.

Me: Why do you think like this?

Hajara: I have never been into mathematics; I have never taken an interest in mathematics. I always tried to avoid the mathematics class. In our country, we don't have the opportunity to avoid things that we don't like. After my 10 grades, I never opted for mathematics, even never thought to go with statistics, economics, and maths because I was not comfortable with them.

Me: let talk about your ten years of mathematics. How were your teachers?

Hajara: Actually, my teachers were so good even I had a crush on my mathematics' teachers. I couldn't find any reason to solve an equation and answer my one question "why to"? Why solve an equation and then "How"? How comes 2nd and why to come 1st. I can never understand "how and why to solve an equation? What are the reasons? How does a person know to solve a question by placing X with y and so on? Why need to make a question $2x+y$. It took too much energy, and the result is always same. I tried to invest my time but it's useless, so why mathematics, opt other fields.

Me: This hate is for mathematics subject not for teachers?

Hajara: It just because of the complicity of the equations, not for teachers. I never hated the mathematic teachers; I have always been in love with all of them.

Me: Were you ever humiliated in the classroom by your classmate or teachers?

Hajara: Actually, the thing is, all of my friends were below average in mathematics. If I scored 33/100, I am getting passing marks, and then they are scoring 40. We all are on the same level, or maybe they were a little bit better than me in mathematics. Therefore, no one humiliated me even my teacher never humiliated me because she knew I was scoring the highest marks in other subjects. In mathematics, I have a problem. She was always trying to help me by saying just passed the exam or test.

They always try one thing: it is compulsory to pass up to 10 grades and never opt for mathematics further. I am interested in psychology as the science of the mind, and I like to study the mind. I don't like to study 1+1 or when $\frac{1}{2}$ what comes, this not I wanted. They did it just to push me by saying, its okay if you are scoring passing marks. It's a rule to study it up to a certain grade. It's not your field move forward, don't worry.

Me: It means you didn't care about your grade and any other reasons they gave?

Hajara: No, I didn't. I only wanted to pass the exam. I also think my teachers and parents didn't try to show the usefulness of mathematics or mathematics importance. I don't remember any other justification they gave. Mostly they said it not your field, just complete it and this thing irritates me a lot.

Me: Didn't you think that a bad grade in mathematics affects your results?

Hajara: Actually, I am a kind of person who was scoring 95/100, 96/100 in every subject except mathematics. This is the only subject that affects the overall performance that frustrated me sometimes. While I was comparing myself with other students, they were availing marks 75 or 76. Performing poor in mathematics was not actually adversity effect on my result and position. It didn't affect me at all, so I don't bother myself.

Me: Have you heard good or bad things about mathematics around you?

Hajara: No, people say that they can do mathematics, but none of my friends, cousins, siblings, no one hates mathematics. My brother always avails 96, 97, 98 in mathematics. My sister also got under the 80s. I am the first person in my family who is totally failed in mathematics, and it was not a big issue. Nobody tried to talk wrong about mathematics. I am the first and last person who used to say I hate mathematics. It's a crack; get rid out of it.

Me: How these hates started?

Hajara: It started with the unanswered question, why, how? Why taking x in front of y. why to put them together like this. I didn't get the answer to my questions about why and how a person uses this. It's the complicity and the confusion. It's everything geometry, algebra. I need logic and explanation for everything.

Me: Were you not good in basic math from grade 1 to 5?

Hajara: I had been confused in the division when I was in 5th standard not in multiplication, subtraction, and addition only in division. I remember it was a surprised board test and nobody perform well the teacher was shouting and shouting. I don't know how but I memorized the process I just held the chalk, wrote the answer, and throw the chalk away, and I knew it was right and moved back to my seat. In 5th grade of learning, I faced confusion

and it irritated me and I started to think why and how. I guess the shouting teacher didn't solve questions in my mind but created why.

Me: What the teacher reaction?

Hajara: She didn't care. This is my nature I always 100 by 100 qualified students but in mathematics don't know why. The mathematics teacher was also taking our other subject. She thought that I was not performing well at mathematics but excellent in my studies and raises my hand every time. Later she told me that she used to think like this.

Me: Why didn't you try to change your attitude for mathematics?

Hajara: Why mathematics? Just leave mathematics. We have other options like psychology, social science, humiliates other basic fields. I thank to God for sending someone who invented such software that can help us to solve statics equations. But mathematical equations all depend on ability, and I have never gained and developed that ability.

Me: But you have those abilities.

Hajara: Yes, Maybe, I gave up earlier age and I thought that I was not for mathematics. As I mentioned, I am a confident person, so I never underestimate myself.

Me: How was your family? They didn't put their effort into improving you in mathematics.

Hajara: Actually, I am the youngest and my sibling scoring higher and higher. They didn't bother about me. My family is like to let her study what she wants to study. They were most concerned about how I am performing in my other subjects—scoring higher in other subjects covering bad scores in mathematics.

Me: They didn't try to help you out?

Hajara: They try once or twice; once my brother tried to help me in the division when I was in 4th standard, he slaps me. I was surprised; it was not a bad experience. When I memorized that my brother slaps me while making my understanding of division, I was okay it was funny for me.

I was around 9 or 10 years old I have other activities to get involved in. On that day I was going to a marriage ceremony, and I was happy. I hardly cried for one minute and then I forgot because I had to attend the marriage ceremony. I was super-duper excited that I dressed up, met cousins, ate and play, and enjoyed ourselves together.

Me: What about your parents?

Hajara: My father was very good at mathematics; he was brilliant and not alive anymore. My martial family is having an IQ of more than 140. They are intelligent but not in mathematics, but they are good. My mother is poor in mathematics, and she is the only person of my kind in the whole family who says mathematics is difficult and sometimes we cannot understand it. The compulsion to study mathematics and unanswered questions increased confusion and frustration in me; I think these were the two things that responsible for my hatred toward mathematics. I hate mathematics to the moon and back.

Me: How this hate started?

Hajara: It was confusion and complexity, and nobody answered my confusion. This started when I was trying to solve my equations again and again but didn't solve them. Then I leave by saying I don't care at that moment. I don't care. In the story "Grapes are sour, I will not eat them," the fox gets irritated, and I also got irritated. I don't want to study it, and people

forced me to study it. These negative feelings were getting more and more, and I used such a rigid word. It really irritates me in such a way that I on hate it for the rest of my life. Math is not for me.

Me: Did you ever try to change your mindset?

Hajara: No, I haven't, for the aptitude test that I applied for university for qualifying an undergraduate and postgraduate program. The whole test was segmented or categorized into five; in which English and intelligent test I passed with full marks and other I scored well. In the mathematics portion, I scored 36%. I left mathematics attentively because I know I got good in other part. So, I left half part of the mathematics. I was confident, and you can say overconfident. I never tried to change my mindset.

Me: Do you want to remove the mathematics subject?

Hajara: I don't have feelings about removing the mathematics subject. I just want to remove it from my life, and I did it. For other, I don't care. It is important but it should be taught up to the primary level. In my opinion, you should be free whether you study mathematics after 5, 6 grade or not. It should not be compulsory up to 10 grades. I support that it should be implemented and included in the course. Basic and simple, not difficult like complex algebra and geometry. These parts of mathematics can be odd and weird for students like me and those who are more active in other subjects. It makes problems and complicates for them, and they deliberately start hating maybe due to its complicity, confusion, and lack of compatibility.

Me: Which types of problems and complications?

Hajara: Getting high marks or positions, overall low grade, parents' expectation, and developed negative feelings for mathematics.

Me: How do you feel while working on a mathematics task?

Hajara: I used to be felt a little confused about what I am going to do. Once I would solve the problem accurately, then I am very happy and excited. If, I didn't solve it properly then I said it is okay. In the beginning, I don't have hard feelings for mathematics. Fear of failing and frustration I had, and this frustration and fear increased day by day, later changed into hate. In fact, I have more disappointment and frustration rather than fear. But I am an open kind of the person like a dude. If I cannot solve it, then I have other options to score. It doesn't matter if I used to be score passing mark. I covered my grades with other subjects.

Me: What kind of these that was?

Hajara: I felt angry; I took my book and smashed it on the wall. I don't care. Sometimes, I feel angry or irritated; I am more like an indifferent person. I don't care, "Go to Hell". I don't care is included with anger, disappointment, and frustration. With time, I take tests for granted because I know I cannot solve them.

Me: In the exam, you have to pass and cannot throw away your books? What did you do at that time?

Hajara: I just memorized the things; it was hard, and it was funny that I had to. All I do was trying to complete a journey. To pass, it is not to fall. I could walk like a turtle who does not fall actually who covers the whole path away but doesn't fall. Who was trying to keep balance and that did not exactly balance? It was an arch I was a walk-through.

Me: Did you learn hate mathematics, or it came itself?

Hajara: It came by itself. It came by anger, frustration and consistently trying to solve the problems and unable to solve the questions. I got irritated and didn't care. I often wanted to find out why it frustrated me so much that I hate this but believe me I have this. But I don't think so much and don't care.

Me: Did anything significant happen?

Hajara: There was not any specific event that happens. It started with my struggling, I tried tried and tried and not able to solve the problems. Anger changed and frustration into disappointment, I discussed that I was not interested in mathematics it is not my field. I am more interested in psychology and education. I passed my 10 grade and I scored 60/100, and I was very happy and now I had to follow what I want to do. I choose history and psychology for my further study.

Me: What is your favorite subject?

Hajara: You might agree that mathematics goes in ascending order and things get complex and harder and harder. Psychology is the subject where things are described an easy way, and then we go to harder than we look why harder. Psychology basically gives the answer of why and how? Mathematics has no point or logic behind an equation. No reason, what are the backgrounds, what happened and why? These things are not told in mathematics. While Psychology explains to why and to what extent? I found answers to why and how in psychology. It tells us why it happened and how to solve it.

Me: Did you take extra mathematics classes outside the school.

Hajara: Once I asked my mother I needed, she said that you scored higher marks in other subjects. You have to do it your own you don't need any tuition and can manage. Maybe, she is a mediator making my mind toward psychology. Being a brilliant student, I didn't take extra classes.

Me: How you describe your feelings of hate?

Hajara: We have criteria when you grow up and start considering the factors in your surroundings. We start hating the things that don't match with us and trouble ourselves and the others. Mathematics is one thing that is creating unease for me, so I hate mathematics. If it creates unease for others, then I don't care. What happenings to others are not my issue minding my own business? It is creating unease for me, so I hate it for the rest of my life. Mathematics for me is no way but for others maybe it all up to them.

Me: Now you heard the word of mathematics what comes to your mind?

Hajara: It's a face bump, no way because I know I have another option. Even thinking about the subject of math is enough to change my mood.

Me: Is your IQ level high? (Already mentioned my family has a high IQ level)

Hajara: My family's IQ level is measured in a normal environment and it's high. If you ask them to build a building, they follow the exact pattern. When I am be asked, I will not follow the pattern. They will do what they have shown, and I will do what I want. You can call it creativity, but this is the primary difference between them and me. I never felt guilty within myself when I got bad grades; I was very good in others. I was bad in it, and I just passed it by cramming. I don't know how I passed it.

Me: Anything does you want to add?

Hajara: I request to parents and teachers don't force children and students to do one thing they want from them to do. Teach and guide them what is good and bad but don't force them. Everyone has a different aptitude and IQ. Individual differences exist, and based on these differences, every child wants to opt for a different field. The one who is studying arts and humanities is not less than those who study medical sciences or engineering. Let them decide help and encourage them to achieve their goals.

Group 2

Kristina

Me: Why do you think these feelings are hatred? How do you describe it?

Kristina: I don't really know whether it's hatred or something else, but maybe it's a strong feeling of dislike. You know what I used to study in school, and I have never been good at it. I never got those feelings that I am a good student in this subject. I could not do my homework as peers did, they always leveled up, and I never even crossed level 1 math. So, taking all these things into account, I never liked this subject, which raised feelings of hatred.

Me: Are your inner feelings? Or the surrounding people force you to feel like this?

Kristina: The answer is both yes and no because at first, it was my own fault for not being able to do maths. But after a while, when I wanted to start doing maths, I also wanted people to help me, but sadly they all give up including teachers, and didn't really care what I was doing. When I tried to talk with my peers, they also felt that I'm dumb and realized I that I shouldn't choose maths, and it made me even more discouraged.

Me: Do you really hate mathematics subject or the mathematics teacher?

Kristina: It is more because of the mathematics subject because I can't do maths. I had many teachers, so I felt I have actually dumber in maths, so I don't like it.

Me: Have you ever been humiliated in the classroom by your teachers and classmates?

Kristina: Yes, both the teachers and my classmates humiliated I number of times, or you can say I felt humiliated because of that I wasn't up to mark in this particular subject. Particularly when classmates would ask me about the numbers, I got in my test, so this is when I used to get frustrated.

Me: You were humiliated by your class fellows? What about your teachers?

Kristina: I think both used to point out that I am doing wrong and used to blame me. I don't like the blame on me. You are doing badly, you need to do more-you need to do this, not this..... Like these comments and it used to frustrate me.

Me: How do you see mathematics? I mean, what do you think it is useful or not?

Kristina: Obviously, mathematics is useful. Of course, we come to know how to count money, especially when you are calculating in daily life. For me, I never try to go and study something because I am not good at maths and my feelings are not good for this. It is useful, but some points trigger me.

Me: How your family members (brothers and sisters) see mathematics?

Kristina: My parents are really encouraging and want to do more mathematics. They want me to be good at maths, but the problem is that they are not really educated, and they don't know a lot. They are not highly educated, so they don't know the types of algebra, linear programming, and stuff. They want to do me better, but they don't know how to do it by themselves, and all of my sisters also don't really like mathematics, and they are not good at it.

Me: Anything significant you want to tell us? That leads you toward hated.

Kristina: There were several events that led up to me for not liking math. I felt frustrated every time I did maths. I felt strange about things every time I started doing maths with my peers and my teachers sometimes. The fact is that I take a lot of time to solve a single problem while everyone else was under 5th or 6th. So, there were a lot of things factors that made me frustrated

Me: Do you remember when these feelings of hate develop?

Kristina: When I was in my first grade, I was excellent in a language like Norwegian and English and excelled in them. I am an open person, and I am not afraid to speak and not afraid scared to raise my hand to ask anything, but when it came to maths, I did not really do well at all. So, in mathematics class, I felt shy and used to sit back and didn't raise my hands even when everyone else was doing that. I didn't get the score, and I accepted it and do not do more. It was the right of way, but I remember that I was in my second or third grade since it was started disliking this subject.

Me: Do you ever try to change your mindset?

Kristina: Yes, I watched a show like "ten talks" from a math professor, and he said that maths a language and if you don't understand its language, you don't understand mathematics but if you do. That's why it is the big difference between people love maths and people who don't. He talked about how it is important to learn a language to understand what I am doing. So, I taught myself, of course, it makes sense that I don't understand maths, so I hated it. I have no idea what's going on? I am taking my high school course again to improve my grade, and I am taking maths next year just to try again because I don't even know how's 2 times table, I don't know how to minus and plus with lots of numbers. I want to work with plus minus and tables to do further study. This time I am motivated with positive attitude, maybe it works.

Me: Which part of mathematics you don't like the most?

Kristina: Be honest, and it's everything which is in mathematics. It's hard to understand fully. Sometimes, I know how to do things but didn't get to the right answer because I don't know plus, minus, and division.

Me: What types of feelings you had when you are not solving problem or achieving the solutions?

Kristina: Its anger and frustration just frustrated me when I can't get it. When I see others, it just feels me like I am stupid.

Me: In these feelings of anger, did you ever wish to hurt the teachers or eliminate the mathematics subject?

Kristina: No, No, it was just only I was just making anger myself I don't get anger anyone. I am a eerson who likes to joke around myself. I probably humiliated some of my other peers as well. But I didn't mean any malice behind it. They were all joking and having fun around

me even at my caste. I am angry about it because it was my fault to being not able to do the maths. I didn't think to hurt anyone, not even mathematics.

Me: Did you learn to hate mathematics?

Kristina: I have 2 elder and one younger sister, and my sister strongly dislikes mathematics like me. When I was started to do maths and I listen this oh, I hate mathematics. That made me to hate this. It gave me also reason to hate maths, okay me too. She really didn't teach me, but I learn from her.

Me: What about your friends?

Kristina: All of my friends are good at mathematics. That's the difference between them and me. I excel when it comes to the language in biology, physics, and I excel in the presentation. Even though they said around me that they hate mathematics, but they still get good grades. Maybe I also learn from them.

Me: Your favorite subject is and why?

Kristina: Psychology and sociology are my favorite. In mathematics, you have to solve a problem, and the answer is what the answer is. While in psychology and sociology, there can be 12 different answers to one question. According to this person, this can happen. You can still be written different kinds of answers, and I can write why this is for me. It is hard to believe that a problem has one answer.

Me: During your exams and test, how you feel?

Kristina: Every time I had a maths test, I feel really stress. My heartbeat became faster, and I could not be able to speak time before the test. I come up with stress, and my palms get sweaty, and I lose focus. From when I read the first question, the feeling of anger and frustration builds up. I really lose focus, so even if there is a question I can solve, I lose focus and end up not solving the problem correctly. When I read the first question, then a feeling of anger and frustration build up and builds up. It makes me angry. I really try to focus even if there is a question I cannot solve.

Me: How much time do you take to overcome this anger and frustration after the test or exam?

Kristina: It happened often before the test. The only problem would be to execute the test, not after the exam. Because I know I am going to get bad grades, I get 1 or 2 even. I am not scared about that, but it's the fact that I have to sit there while I know I can't solve it. I start to stress, and my palms get sweaty, and I lose focus. From when I read the first question, the feeling of anger and frustration builds up. I really lose focus, so even if I can solve a question, I lose focus and end up not solving the problem correctly.

Me: You are all the time?

Kristina: I don't know if I do well in mathematics next year when I am taking this subject. Maybe it will move away. It's not always I hate maths. If I executed the problem, I would get feel really happy. I proud of myself as a person, but when I go to another question, and I didn't, and then I hate it. It's all comes to if I do well or not.

Me: How's your classroom environment?

Kristina: At first, my teacher was very consistent, and they try to get to know me to understand maths. I already made up my mind that I didn't get it. When evened they tried, I have already given up. When I came to middle school, I said, okay, this chapter; maybe I start again. I try to start again to learn it. In middle School, i test to understand where you are? I

took the test, and I think she comes to know that I do not have a good attitude toward maths. So, she gave up on the start. I would see there to talk to everyone else and do whatever I want. She already makes mind that I am not good, so she really doesn't care. I think that teacher contribute 30% in developing these feelings of my hate.

Me: The rest of 70%?

Kristina: 10% peers and family, 10% humiliation and the rest are me that I didn't work hard enough and didn't put more effort in. I hate to feel like this; I am not able to do it. I am the kind of person who cannot do it, and then I don't put effort into it.

Me: Now you are going to take a mathematics course; how your feeling?

Kristina: I will again start my journey with mathematics in January, and I am excited and saying myself, I have to do it. I have to do it. I have to improve myself. I want to do radiology and have no problem with my studies' anyway, but these Math's are the only subject that dragged my GPA down. Now I have to do it even it is hard, which makes me sad and frustrated. I just have to do it. I am really trying to change my attitude towards maths this time. I am ready to put effort into it to learn. I don't think I tried my best when I was at my school. But this time I am developing positive thoughts and attitude before taking it again.

Me: Did you ever try to help others or outside the schools try to improve yourself?

Kristina: I did it, and there is a place "homework help" to assist you. It for us that our parents are not educated and don't know how to help you. There was a teacher who is really consistent actually help me. But my schoolteacher is not, and it can be a reason I totally fail in maths. I got the lowest of the lowest grade. I got 3 and 4 but not 1 and 0. I cried a lot. I was just frustrated because I started my study before 3 or 4 days before the test. I didn't understand any think in stress. Get frustrated and start crying. I cry alone and sometimes in front of my dad. He wants the most to be excelled in mathematics, always asking how things were going. I want to achieve the things which he wants to achieve.

Me: Your strategy for preparing for exams is the same for all subjects?

Kristina: I did it for all of my subjects. In psychology and sociology, there are different ways to study to different subjects. I am a very quick learner when it comes to language, grammar, and history. I learn quickly and forget quickly. I didn't understand in mathematics at all and don't know what I am doing, so I didn't learn anything and wasted my time.

Me: Have you any person who influenced you in a good or bad way?

Kristina: Yes, my teacher from middle school. She influenced me in a bad way. That was the period when I really feel that I am stupid, and she always tries to feel dumb. She tried to humiliate me, but I am not the type of person to get humiliated easily. I know everybody knows I am bad in mathematics anyway. I don't know for some reason, and she really tried to humiliate me. When she gave back my test, she gave very openly to showing my test in the class. I don't care because all of my friends know, but I saw that she tried to humiliate me by showing my first page and grade very openly, just tried to let me feel bad. She influenced me in a bad way because she really realized to me that I don't need to do it. I don't want to try in her class because when I actually try, she really, and these times I actually try all the other times I didn't. It makes sense she only tries to feel me badly by saying my grade very loudly and not talk. She didn't do it with anyone else—one of my class fellows worse than me. If I got 2 or 3 and the other girl got 1, she was still nice to that girl. She was precise to her not stroke her back. Oh, I have to try this. Have you tried this? She talked to her in a very nice tone, but to me, she feels I really don't care.

Me: Do you want to add something more?

Kristina: Other than that, I don't have.

Laila

I was born in Europe, after five years, I traveled to Middle East. I was there for 12 years, and after the war in my country, we traveled to other country to get my high school certificate. I married a guy who lives in Norway and has been living here for five years now. I have one child, and she is three years old.

Me: What do you think about mathematics?

Laila: Mathematics is challenging because in school and the world, I can't understand really. How can I apply mathematics in the real world? So, it's challenging for me.

Me: Is this subject is different from the other subjects?

Laila: It is different; it just has a lot of numbers it doesn't have meanings. In my opinion, I can't relate to elaborate on it, So I can't feel attracted to mathematics. I want to get rid of it. When I was in my school, it was really strange, the school depended on mathematics, and if you are good at mathematics, you would be good at school and go to the University you like. I very intuited in biology, that's why I go to biomedical training now.

Me: Don't you feel Mathematics is useful?

Laila: Yes, Sometimes, in everyday situations, when you need to apply, how many things do you need. The easy mathematics that we have in our daily life is very important. It has a lot of things that we didn't need to learn.

Me: How your teachers, school environment, and school life?

Laila: It was not the same as in Norway. We have a very competitive school, and all the students are just competing with each other. Teachers are harder on the students, not in Norway. If I don't do well in school, I can get punished in the school.

Me: Which types of punishment do you have?

Laila: One of the punishments was that I didn't like that if you don't understand anything from mathematics. The teacher will ask you to just get up to answer this mathematics problem in the whole class. Okay, I will go there (onboard). It will be a little bit difficult, and she screams at me and say that I can just stay in my place for the whole period. All students stare at me, thinking she is stupid and a bad girl who doesn't understand mathematics. It was just humiliating. I felt so bad because I was very good in other subjects, only in mathematics. It was.... Ahh, (she did it with a smile, while thinking and talking about her past)

Me: This humiliation was more from your teachers or your class fellows?

Laila: We all know each other and living in a small town in the same area. They didn't give negative feedback because they know tomorrow it will be them. The negative feedback mostly I got from the teachers she was so hard on the students.

Me: Had you also experienced good teachers or have bad mathematics teachers in your school?

Laila: When I was in my last year of elementary school, we have the tough exam at the end of elementary school. We just have a very good mathematics teacher. It was eye-opening for me to find mathematics a little bit easier than I learned before.

Me: How your mathematics in grades 1-4 or 5?

Laila: I didn't feel anything in class 1, 2, 3, and 4. In 5 and 6, a lot of things are going on, and we are going a little bit older and have a lot of feelings. We had very bad teachers at that time. We didn't develop good enough to be students in 6, 7, and 8.

Me: How is your performance in class, and how's your exam performance?

Laila: It was very bad, but I was very good from my 1st to grade 4th and did really bad from 5 to last year.

Me: Have you ever thought that you are not mathematics students?

Laila: No, I don't have those feelings that I am not a mathematics person. I have a rule that if I need to be better marked, I need to go back to and learn basics very good. I can be very good at putting in hard work to get better results. I can't judge myself because I get bad grades in mathematics in some of my classes.

Me: These mathematics results affect your overall performance and results?

Laila: Yes, it affects me now because I am studying hard chemistry and pharmacy. I need to study a lot related to mathematical thinking due to a lack of concepts. When I have those problems, I need more work to do at home. My friends have better understandings.

Me: How your family Maths? (Siblings, parents in doing mathematics)

Laila: I have a lot of siblings; I have five younger than me. Two younger sisters; they are very good at mathematics and other school subjects. I have three brothers, and they don't like mathematics. They hate it, and I think that the younger generation doesn't like mathematics. They like more Arts, biology, and technology.

Me: What about your parents?

Laila: I don't know much. My mother likes mathematics, but I don't think my father does. There were two extremes: literature and scientific extreme, and my father like literature.

Me: It's meant you didn't get any help from your parent in mathematics?

Laila: From my 1st to 4th grade, I was just dependent on my mom. She was just helping me with my mathematics' problems. When I was in 5th grade, I was older. I have many younger siblings, and the attention goes spread, and I was alone with a lot of problems and depending on my teachers. My dad was a businessman; he wasn't around all the time.

Me: What about your classmates?

Laila: The classmate was the same as me and struggling in mathematics. It was challenging for all of us. Indeed, I was very demonstrated in my 8th grade that I told my mom I need a private teacher at home for just mathematics. I am good other, and It's just mathematics. Do you know that feeling, if I didn't do you anything and I can't pass. Such a horrible feeling came to me when I was struggling. Then, I went straight to my mom and demand a private teacher.

Me: Have you got extra help, and its works or not?

Laila: I get extra help, and the teacher focused on the basics, which I got. OH, MY GOD, I am not good at basic. We have division and have techniques for divisions. I didn't get and know about it: the teacher was focusing inside, and I didn't also get good grades. So, I just ah..... I did good work, what's the problem?? When I was in my 1st secondary class, I took benefit from the teacher. In the 1st year of high school, and felt I am bigger now. I have my own choices. It was good for me to take more time on mathematics and be good at mathematics.

Me: So, this extra Mathematics class didn't help you so much.

Laila: Yes,

Me: Have you heard about good or bad mathematics around you?

Laila: Of course, (Suddenly response before completing my question) Mathematics had always bad overflow all the surrounding people around me. My friends don't like mathematics, so I think it's overall hate for mathematics.

Me: And in your family?

Laila: It's the same, it just has two sisters, and they like mathematics and like it because they need good grades.

Me: Where is the problem in developing these feelings?

Laila: I think it was the bad teachers because I really like myself, and I am a smart girl. But when you are humiliated in the school around your friends, you don't get what the problem is. When you are young, all the feelings develop previous humiliation and come alive with the new one. It was a turning point after 5th grade, and I hated mathematics so much. We had the same teacher for three years, 5th, 6th, and 7th.

Me: Which thing contributes most to your teacher or mathematics subject?

Laila: I don't know, mathematics is a complex subject, and the teacher was very bad. It just adds it up. It's the same for me the complexity of mathematics, and the teachers add it up to make the result.

Me: If you got good teachers, then what you thought?

Laila: Oh, yes, it would be better. I had a very good Biology teacher, and that's why I am a biological student now. Teachers are matters very much. On the other hand, the Biology teacher was very well-coming she was very open-minded. She said, it is great if you don't know the answer, we will find it out. I like the scientific research I learned from her. I just talk and laugh. It was not just the teacher but the subject as well. On the other hand, it was a class where I go happy and came back happily.

Me: How you feel while working with a mathematics task?

Laila: I opened the book, and its mathematics' problems. I just read it one and once again, and again it's the same. I didn't understand a thing, then I go back to the lesson that we took and just read, and I didn't understand. We didn't have YouTube back then. We didn't have that many books. We just have the textbook from school, and it was I didn't know what I can do. I just close the book and go to school. I was the just feeling was that how can I understand what it is. How can I do it? So, I hate it because I can't do it, so I quit, and this was the whole thing.

Me: How are you saying that this feeling is hate?

Laila: These feelings are frustration and disappointment in me in the subject. I was also very angry with the teachers. It is also a pain because I didn't complete my assignments.

Me: How you handle these negative feelings?

Laila: I handle my feeling through crying, and I like expressing myself through writing. I write in my diaries just, and I hate it, I hate it, I hate the teacher, like this. I have many siblings, so when I had so many feelings, and I cry so much. They said, oh my God, I am a drama queen. My mom listens to me. Sometimes my little sister listens to me, but all the time, it's me and my book to express myself in writing.

Me: Have you fear in your school life?

Laila: Yes, back then, I had feared it is in our culture. I didn't fail in my whole school career. I passed all the subjects, so you couldn't get how shameful it is, to not pass the exam. I was very shameful and fearful, what if I cannot pass the exam. That's why I went to my mom in grade 8th. I feel so fear and afraid, oh my God, what can happen if I fail. It's not you can retake that subject you have to take the whole year again. So, I was so shameful. So, I get a private teacher.

Me: Were you humiliated in the mathematics classroom?

Laila: Yeah, I didn't like to go to the mathematics class. They take a lot of energy. The whole time when I was waiting when it is be my turn, and I will be humiliated again. I was much stressed. When you are on the board, the whole class on you and the whole anxiety thing come to life. Sometimes, I had a question, and I am very afraid to express myself. If it fails, I get punished, so I just keep it myself in the class.

Me: Which types of punishment did you got, it is physical or mental?

Laila: We didn't have physical punishment; it was allowed, but mostly It was mental. You can throw out the class. You are not supposed to stay in my class. Sometimes you have to stay in the same place that you were on the board. My teacher mentally punished me.

Me: How you get your grade in the class?

Laila: It was in our culture that we couldn't do anything. Grades are in the hands of the teacher, and they gave them. You have A, B, or C. We have another different grading system oh you got D, oh.....(In bad tune) you are not good at this.

Me: Do you have more anger or fear in yourself?

Laila: I was angrier with teachers, not myself; I was disappointed that I cannot complete my assignments. No, it was fear about me. I was angry that I didn't complete it properly. It is not what I get in school from mathematics class.

Me: Do you think it's your fault?

Laila: No, it was not my fault, and I knew back then it's not mine.

Me: Do you want to ruin or remove the mathematics subjects?

Laila: No, it will be a drastic thing if we remove mathematics from the world. Actually, we need it. How we teach mathematics is very challenging that kids cannot understand cannot relate to. It will be good if we make the teaching more relatable.

Me: What about your teachers?

Laila: (she laughs too much and enjoys the question) Yes, I have. I can't get rid of her face and expressions. I am older now and don't have those hurting feelings now. But I did have it

when I was younger. I just hold that she will vanish or break her leg and not come to school. I don't have the wish to hurting her or killing her. It was not at that extreme, but I hope that she doesn't come to school. I was just hoping she gets a disease, breaks her leg, and vanish her or get into a car accident may be. I only hold that she doesn't come to school around.

Me: Do you have the same feeling for all mathematics teachers you got?

Laila: It was just one teacher, not all. It was in 5th, 6th, and 7th. In 8th grade, I got a private teacher, and we have the same teacher in the class. It doesn't make that change. In my 9th I got a very good teacher she cannot make that good expression in just one year. She cannot go back and teach us all the back things, and we already hate it. We just have a defense mechanism that we can't understand mathematics, but I also had very good and better teachers in my high school when I was in the first year and second year of my high school.

Me: Did you learn to hate mathematics, or it came itself?

Laila: I learned to hate mathematics, and I didn't get it naturally. I had a good feeling for mathematics when I was in my first grade to 4th grade. I develop the hating in my 5th. So, I think it's not natural. I learned it from my surrounding from the teacher in the school.

Me: Were any significant thing happened that you are disliking turns to hate?

Laila: It was my first standing position. It was the moment when I was humiliating in the class. When my teacher points out to go to the board and solve the problem, I was there for the rest of the time. I was there for 45 minutes.

Me: Mathematics has different branches; which part was most challenging for you?

Laila: Geometry sin, cos things it was difficult one. Because I didn't seem able to analyze theorems, and there are many theorems you need to apply to self-problem to solve it, it was difficult for me to just analyze and apply it.

Me: Have you ever tried to change your mindset?

Laila: No, I didn't know that was my mindset. I didn't know what the problem is. I was just frustrated, and I was with my feeling and my books.

Me: What's you're feeling when you heard the word of mathematics?

Laila: In the past, mathematics is called one subject that I can't make progress in. I have anger, frustration, fear, and it was a very dark moment for me. Because sometimes I cannot sleep in the nights and when you are in your family, there is a shaming thing. Oh, my God, you have a lot going on. And I said no, it's fine, it's okay, and when the grade comes, why you have an E in mathematics. The entire environment, I did feel that it's not me, but I didn't express it to others. I just take the fruits from the others. It's you who get bad grades, and I didn't feel to change my mindset at that time I don't realize it. Now for sure, there is something difficult that I can't change my action to have a good result. Now I have a very deep subject and have no idea about my school-time. At first, it's scary what I can do about it. Just do this; do this. I have a lot of techniques and resources and get more time on it. Now I know to change your techniques change your actions to have a different outcome.

Me: Which type of personality or nature do you have?

Laila: I am a strong person. I can't get compliments and bad reviews as personal. It's about the thing that I did. I didn't feel the same back when I was younger. I was obscure. I have lots of feelings about developing my mindset. I didn't know what mindset is. I was just living. I took bad review as personal. If someone says you are not good at mathematics it means, I am not good.

Me: How your reactions when someone says such things to you while you are putting in your efforts?

Laila: I am a very calm person. I don't shout, but I cry a lot and write a lot. Until today, I cry and write a lot. I also depend on the feelings, the feelings I am open about in everyday life. When I was happy and sad, I shared with it. When I was disappointed, scared, and frustrated, I don't share it. I keep it to myself because I know I can't change it. I know people judge a lot, so I keep it to myself and have another coping mechanism.

Me: Was there any person who influences your thoughts?

Laila: I had a good teacher in my first high school year. She was not very old. She was 23 years old, and I was 16. When she came into the class, open with struggles that we had to meet with these particular lessons. So, I just noted all things. When I go back home, so I know today, I have four mathematics struggles. Today I have three struggles I need to get more time to prepare. She prepared us to know there are struggles in mathematics. You can fight with struggles and deal with them, take with it, and you will be fine. She was very open and good at questions and in wording. I like her wording when I get a good grade. It was full marks in my first semester. She said, "Woo, you get the full grade, and that can be assistant of me in next semester. I felt very proud of myself." I had my ID card; I was very happy because I work hard, and I feel the struggle and manage to get through it.

Me: Are you confident to raise your hand in the classroom and asking questions?

Laila: I like to raise my hand and express myself. I am very good at it. I feel that I am a smart girl. I just open myself, am myself, and think freely in the class. It was different in my elementary school. I hate the teacher. You cannot raise your hand because you are very scared to death that something happened. In my first year, I was very open. If I failed to find answers, there is nothing happened. Another answer? The teacher said you could get your answers. Is there another person who likes to comment on this? It was more group work than classwork.

Me: You learn from three different places how your experience?

Laila: In other country, I was only for one year. The school system was different, and I just needed to get my certificate. I wasn't that harsh because I had other resources. If I don't get the information, I just go to check the internet, I was in Cairo, and it was a very big city. I can go to the library and takes books whatever I want. It was more resourceful, so I didn't need the teachers.

Me: Do you want to add something I didn't ask but happened in your life and important for this work?

Laila: I think they should have a good school system relating to mathematics with everyday items. Even calculus, algebra, geometry, and all the things present in our lives still, I don't get it. If we learned to connect everyday life with mathematics, it would be joyful, useful, and easy to understand. The teachers don't need to teach 1+1. There should be more group assignments and tricks to do mathematics.

Karen

I am 61 years old and did all my schooling in the European country up to teacher training. I worked as a teacher for about ten years; then, I studied again to be a programmer in IT. I worked about ten years in the IT sector. I also worked and lived in other countries before Norway, two countries in Africa where I taught computer science. Then later, I did a master's in business administration. I also worked with a publishing company that publishes schoolbooks. I came Norway and first I didn't have any job and I started my own business. This was very difficult, so I did some projects at the university. I worked on three different projects before I became employed at the university. Now I am employed in a field of pedagogic.

Me: What is mathematics for you now and at the time of learning?

Karen: Let me start when I was learning first in primary school. I was pretty good at mathematics; I had no problem at all. It was pretty easy for me because all the schoolwork in primary school was easy. Then, I came to secondary school, and the secondary school was streamed in levels, and you can go level 1 is practical level 2 is academic. The highest was purely academic and I went into the highest stream (six years, comparable to A-level in UK). The first year was very easy with mathematics again then 2nd year became more difficult and boring. I didn't understand why you had you do it in that way and in the third year, my marks dropped a level further. As, time passed it was getting more difficult. For me, it was very abstract; I didn't see the point and teacher didn't really explain why you can use it and why you need it. In my fourth year I was in the class where all the students were in the same stream struggling with mathematics. We had a teacher he was nice but still the mathematics did not attract me. Only the Statistics course made sense to me. But all the algebra and geometry and the way it was taught at that time it was difficult and not interesting. I did not see what mathematics had to do with life in general. The teacher was explaining the same again and again. They couldn't explain it in any other way and connect it with something or make it meaningful. I actually wanted to go in a profession where I need mathematics so here comes the frustration. I was advised not to take mathematics further after the fourth year and to choose other subjects. This also cut off my career possibilities in a way. At the time my school very much discouraged you to take mathematics and physics if you were not good at mathematics (in particular the girls were discouraged). I went on with my studies and didn't choose mathematics for the last two years of my secondary school, so I had limited possibilities what to study further on (at university level).

Me: Are the problems with the teachers or with the subjects?

Karen: May be, a little bit the teacher as well. I had the same teacher for three years and the one I had the 4th year was better and nicer. I think it was the content and the way it was taught, the fact that it was abstract. I had other subjects like economics where a lot of graphs, calculations etc. were used and I had no difficulties in understanding that. Where in any other subjects' mathematics was involved, I didn't have a problem because here it connected to something, and it had meaning for me and made sense. A fourth year, physics, the mathematics I could understand. In my teacher training I also had mathematics. I was just easy, and I started to like it again at teacher training college, because now they had a different focus, and it was more how you can teach mathematics in a more playful to teach. Although I got a new topic which I never had before, and that was okayed. I didn't have a problem. After 10 years as a teacher, I started a study in IT and programming, but in order to be admitted I needed to pass an exam in mathematics, so I had to study mathematics the way it was taught to me in the secondary school again a little bit higher level where I stopped in grade 10. It

was again terrible mathematics; it didn't make sense. There was one new part for me; it was logic that was okayed for me. I could understand how the logic was important for my programming skills. Luckily, I had someone who helped me through it and explained very well. I got the highest marks possible for the final exam (in maths).

Me: It means you are a brilliant student and put lots of effort into it?

Karen: I want high marks. Maybe I was also in secondary school I was frustrated because I was putting so much energy just like in other subjects, but I didn't get high marks (in maths). It was the mismatch between all the energy I put in and the fact I am not getting outputs. I could not be stupid because I could do so many other things and why did I not grasp mathematics. I always had a solution worked out for my math tasks and I thought it was correct, but it turned out that it was not correct. Then I asked why not? You had to do it exactly their way, there was no other way you could solve the problem or write it down. If you said that the result was the same, they said no it was not the same.

Me: What is your favorite subject and why?

Karen: My favorite subject is physical education, because I like to play games especially 13;20 to be out to be active and to play. My other favorite subject is geography.

Me: these both are very different from each other?

Karen: Yes, very different I think it is not fair to choose physical education as a favorite subject. It is so different from all other subjects (no exams, just fun and challenging).

Me: Why do you like geography?

Karen: I like geography due to its content. I like the fact to learn so much about so many topics around us on the earth on countries on people how people build, nature, how they work together and how rivers are being formed. It was also very visual subject. I had teacher who showed a lot of pictures and videos. At that time, we didn't have so many videos, but we had slides. There was a lot on volcanoes and how they worked. It was very much visual representation, and I like drawing.

Me: Why are you working in totally different dimensions other than your favourite subjects?

Karen: Yes, first it was programming and programming I like in a way but not like to work 40 hours in a week. Because it was so individual work often. I was used to be a teacher and then you work with people the whole day. As a programmer, I was opposite, you work with people maybe one or 2 hours a day and then the rest you have to set behind the screen and working your own and that I found difficult. Now I ended up in a totally different field, pedagogy, and I don't know how I got here. When I was in the teacher training, I didn't like the subject (pedagogy). It was too much talk about nothing, but now I try to make it different for my students. I make it much more practical and more related to what you see and do in the schools.

Me: How was your school environment?

Karen: I think I take secondary school (because it was the only secondary school when the problem with mathematics started). About half of the class was good at mathematics and half the class was not. There was clear division between those who were good and liked it and those who are not good in it and didn't like it. I remember that there was somebody in my class who lived pretty close to me, a fellow student, and I went to him, and he tried to explain to me how to do equations, integral and algebraic questions. I sat with him quite some hours,

but he did it just the same way as teacher did it, so it didn't help, I just felt he was repeating on and on again. I think he was also kind of desperate that I didn't understand all this.

Me: Which part of the mathematics you don't understand or don't like the most?

Karen: I didn't mind all those parabolic graphs we have to draw lines and find out where these lines hit the parabolas or where it cuts two points that I didn't mind. When I could draw and visualize, and I could check if I worked it out correctly because the visual part and arithmetic part is connected. If I did, one can check the other and the other way around. That was an okay and statistics was also okay. Geometry was OK; it was mostly algebra.

Me: If you were struggling and not understanding mathematics, have you asked for extra help?

Karen: Sometimes in my class I asked for explanation from the teacher and sometimes I asked fellow students after school to work together.

Me: What about your school environment?

Karen: Formal I would say, the way the teacher and students interact it was pretty formal.

Me: Do you feel hesitate in asking questions?

Karen: Yes, from a particular teacher, yes, I felt.

Me: You are a good and confident student then why you felt like this?

Karen: I sometimes said I did, but every time I did, I didn't get the satisfying answers. So, the teacher maybe thought I didn't hear him the first time because he just repeated himself. When I asked, I was expecting that teacher would explain it in a different way that I would understand; there was not much point to me to repeat the same story.

Me: Why you were afraid of solving questions on the board?

Karen: It was not maybe fear and I didn't feel brilliant in mathematics. The teacher was not very invited, and we didn't have that very many activities on board. We had to work on our notebooks and the teacher would do (the task) on the blackboard. I don't remember much that we were asked to do sums on the blackboard.

Me: How was your Mathematics teacher?

Karen: The one teacher in my secondary school was very formal and strict, I would say.

Me: His attitude effect on you're learning or not?

Karen: Yes, I think so. Maybe, if he had been more open and friendly. I don't know I think that would have made a little bit difference. It also the content and the way it was presented and the content and the was present was irrespective of what teacher I would I had. We had about 6 different Mathematics teachers at our school, and some were friendlier, that I heard from classmates, but they still have the same schoolbooks. I think it made a little bit difference which teacher you had. It difficult to say for me that how much it would have been different, but I think it would help.

Me: Have you heard unpleasant comments from your teachers' while not working well in mathematics?

Karen: Indifferent, it felt to me as it didn't hear. He was not like once who say on performing very to say well-done, not on bad performance. We just go and collect our marks and that was it. There are no positive and negative remarks in my memory.

Me: How was your family in doing mathematics?

Karen: I am the eldest my father was working as an administration, and he was doing a lot of calculations and that was simple calculation for me. Addition, subtraction, multiplication, division, and percentage. These were the things necessary in his job. He was good at what he did. My mother didn't have very much schooling certainly not in mathematics, but she was in a way had a natural sense of mathematics in way she was sewing, cooking, in practical things where we need to measure. If you can make clothes, you need a good sense of 2 and 3 dimensional to measure the things. How it will fit how much fabric you need. So, that you are how much you by and don't spend too much money or but too little. She had practical understanding for mathematics. In my siblings none of them are excellent. My brother did well-enough, but he took longer route to do the same I did in my secondary school. Therefore, I was easier for him I think, because spent 8 years on reaching the level that I spent six years.

Me: Have you learnt to hate mathematics from your surroundings?

Karen: Yeah, negative feelings came a little bit when people said in my surrounding that mathematics is difficult and that we as girls were more discouraged to take mathematics as a subject. It influenced me but at the same time when I later continued in teacher training college it motivated me to make mathematics as assess able as possible (for pupils). So, I would never communicate with my students and pupils in school that mathematics is difficult. I would always try to make it practical and understandable. So, it motivated me later in teaching in different ways as far as possible because you still have the schoolbook that can be old-fashioned.

Me: It means somehow you learnt to hate mathematics?

Karen: No, nobody told me to hate mathematics; I don't think anybody teaches you to learn hate mathematics. The stressful environment which in some way made that I hate mathematics. In my class also I didn't have any classmate with an attitude to hate mathematics. There was a not such culture and environment that we spoke about if maths were popular or if you hated mathematics. I don't think we had that.

Me: Why do you think these feelings are hatred?

Karen: The hatred comes from the fact that many people from mathematics and the teachers in the secondary school. They found themselves so important and their subject and if you didn't understand their subject and you feel dumb in a way, and it was different from other subjects. I always mean some students are good in one subject and some are in others (and that's OK), but these feelings of mathematics teachers that they are superior to others and their subject a so much superior to other subjects. I will be the cause to hate: the fact because they their subject is superior in the combination of the feeling that you are dumb, and you don't understand it.

Me: Is there anything significant happened that you dislike turned to hate?

Karen: No, there is no pinpoint. I think hate is more like "a big distance" you don't want to do anything in it, so you push it further away, that you hate it. If you say you dislike you don't push it away so much. Yes, but it's like you don't want to have to do it anything with it. It's like you blocks it out when you say I hate it.

Me: When you struggled to solve mathematical problems, which types of feelings did you have and how did you handle them?

Karen: In daily life I didn't come across any mathematics that I could not solve, at that time. It was a big frustration. I do not remember what feelings I had at that time. I didn't react very strongly, the fact I dropped the subject which was advised. I said its ok, and it was over. Maybe I will go to physical education. It's like flying away from it. I would do my work for my exam, but at a certain time I stopped and would not go on and on. That must be enough now okay, if I don't get it, then I will not go ahead. If I want to work more, I will do subjects which I like.

Me: What you're thinking now for mathematics?

Karen: I think when I am looking at my country the way mathematics is taught in secondary school is completely different. Still, now I could easy manage at the first level of mathematics, and it is compulsory to take up to the end of schooling. It is different than my schooling time when you can drop subjects after the 4th year (grade 10). I am looking at it now. It could be a proper tool, relevant, meaningful, and fun way to do mathematics.

Me: Was there any person who influenced your thoughts?

Karen: Yes, my partner influenced it. She understands and discusses certain things that she knows I can relate to and I like that. She knows I don't like or understand this topic she will not discuss the theoretical, abstract parts. We share that part of mathematics which is more practical and linked to the world. There are no negative feelings from my side now.

Me: How you treat mathematics?

Karen: I want to change it, both the people and the subject, but I don't want to remove it. I would like to remove all the no-sense, very theoretical mathematical that people cannot explain why and where you could use it. If there is no need and you cannot explain what the purpose is. All students in my class were clever enough. I think hate is not always like to want to destroy and remove. You can hate it without wanting to destroy or kill it, but it can also that you want to keep a distance or want to change it completely. So, I wanted to make a distance and I didn't want to do anything with it at that time of mathematics in school. Hate is not always translated to destroy or kill; it can also be that you can go far away from that you hate.

Me: Have you felt anger or blame on yourself that I am putting so much effort and not getting output?

Karen: Yeah, I got anger, but I think instead of anger it also the feelings of incompetent that why I can't get it why there is exactly this way to do it. This sort of anger I had and when you hate it you stop being angry at yourself and don't blame yourself any longer. That is the difficult phase that you are struggling. Then, you blame your subject your teacher and the whole system.

Me: Have you ever thought that you are mathematics' student?

Karen: No, at that time maybe I had such thoughts but not anymore. I was more disappointed doing it, but I didn't fear and embarrassment doing mathematics.

Me: Have you hated with your teachers?

Karen: No, I didn't like them, hate is too much. The way subject was presented and the way they taught. The way they were formal and strict and that they felt superior and important.

Me: Was mathematics useful for you?

Karen: The mathematics we learned in our secondary school; I didn't use it. I just use basic mathematics that I learn in my primary school schooling.

Me: What word came in your mind when you hear it now?

Karen: I can be very fun but it also important for mathematics teachers not to go to the very theoretical mathematics without linking it to the real world. It can be fun, but there is lots of mathematics which is hard (and frustrating) for the children and the students.

Me: How will you interpret your hate?

Karen: It's something in there in you, but you cannot interpret, you haven't given it a name yourself. When you heard from people they hate and suffer that made you realize what they said, and you are also in that range. It's more coming from outside and labeling. I never said that I hated mathematics explicitly.

Me: Do you want to add sometime?

Karen: I think it's very important that it recognized that people dislike and hate mathematics. I hope teachers will realize that they are as part in that, and they hopefully try to change. So, that children don't hate it and don't fear it. A lot of children have also feared for mathematics. I understand it is very difficult to research especially on children like primary and secondary school. But I think in future it would be very valuable if this research could also be done at the much earlier stage. This is a good step to be aware of that it exists and maybe some people shift their research to younger age.