Remittances Review
August, 2023
Volume: 8, No: 4, pp. 4782-4799
ISSN: 2059-6588 (Print) | ISSN 2059-6596 (Online)

Received: 11 November 2022 Accepted: 15 March, 2023
DOI: https://doi.org/10.33182/rr.v8i4.308

Identification of Mathematical Learning Difficulties among the Secondary School Students of Humanities Group of District Lahore

Dr Fahd Naveed Kausar[1], Asif Saeed [2], Ehsan Elahi[3], Irsa Mehboob[4]

Abstract

The purpose of this study was to determine the prevalence of students with mathematical learning disabilities (MLD) in secondary general mathematics classes. A sample of 344 pupils was chosen specifically for this purpose. The phrase "learning difficulty" does not imply a lack of intelligence; rather, it indicates that a learner may experience difficulties as a result of environmental, educational, emotional, and physical variables. It involved creating a screening checklist to identify general mathematics students who have mathematical learning difficulties (MLD) and creating a mathematical aptitude test comprised of exams known as the Mathematical Ability Test (MAT). Experts in the relevant field provided their opinions to confirm the screening checklist and diagnostic test's content validity. The Mathematical Ability Test's reliability was assessed using the 0.584 Cronbach's alpha coefficient. It was discovered that the Mathematical Ability Test's concurrent validity was 0.401. Descriptive and inferential statistics were used to examine the information gathered. The gender, rural location, low and high achievers, and other student characteristics were compared among the students using an independent sample t-test. At the secondary level, the proportion of female students experiencing learning challenges in mathematics is significantly higher than that of male students. The percentages of male and female students with learning disabilities were 0.5039 and 0.4892, respectively. The average percentage of kids that learn maths is 49.65%. It was strongly advised that a training programme be started in order to increase the capacity of secondary school math teachers. In addition, educators must employ activity-based pedagogical strategies to ensure that mathematics is learned effectively and permanently.

Keywords: *mathematical learning difficulties, secondary schools, humanities group, district Lahore*

Introduction

These days, having strong mathematics abilities is essential for both obtaining a good career and living a comfortable existence. Higher levels of mathematical proficiency are associated with greater job prospects, higher pay, and improved well-being, according to research. Conversely, a lack of mathematical proficiency wastes tax dollars for the government, private citizens, and businesses. It illustrates how important mathematical abilities are to people's professional advancement. The researchers discovered that students' memorization of textbook material is the primary cause of mathematical learning challenges, or difficulty in learning mathematics. In particular, it has to do

[1] Assistant Professor, School of Education, Minhaj University Lahore, Punjab, Pakistan, Email: fahdnaveed1@hotmail.com
[2] Assistant Professor, Department of management sciences, COMSATS University Islamabad, Attock campus, Punjab, Pakistan, Email: Mian.asifsaeed@gmail.com
[3] M.Phil Scholar, School of Education, Minhaj University Lahore, Punjab, Pakistan.
[4] Independent Researcher, Gharoob, Mirdiff Dubai, Email: Irsa_mehboob@hotmail.com

with students using copied strategies for mathematical information rather than using reasoning to solve problems. The strategy application for Content Ability consists solely of writing the response; the plan selection is based on recollecting the answer through retention (Aftab, et al., 2021). Reasoning Ability is the second category of learning strategies. Coming to a conclusion or forming a new assertion based on a proven or true statement requires thought.

According to Westwood (2003), learning issues are typical challenges that students encounter when picking up new vocabulary or perspectives. According to Hilty (1998), a variety of factors, including prior knowledge and comprehension, cognitive ability, instructions from teachers, syllabus content, assignments and activities completed at home and at school, teachers' language, students' confidence, the applicability of basic means, and the theoretical value or significance of the learning task, interact intricately to cause learning difficulties. The phrase "learning difficulty" was initially used in the 1960s at formal educational institutions that offered standard instruction. Schools for special needs students were also reorganised at that time, and establishments meant for academically abnormal students were renamed as institutions for learners facing learning challenges (Ashraf, et al., 2022). Pupils diagnosed with specific learning disabilities (SLDs) face significant challenges in achieving specific academic goals. Hanich & Jordan (2000), Geary et al. (2000), and Johnson et al. (2010) pointed out that research has shown that students with learning disabilities, even though they have a sufficiently high IQ, predict both academic failure and specific reasoning deficiencies when interacting with their typically developing peers. Learning problems are a subcategory of mathematical difficulties (MDs), as expounded by Badian (1999) and Gold et al. (2013). Mathematical learning challenges may result in a significant loss of proficiency in concepts like algebra, operations, and geometry (Khasawneh, 2020; and Ullah, & Malik, 2022).

Most students find mathematics to be a difficult subject to master, according to Mushtaq, et al., (2023). Arithmetic curriculum disruptions and problems arise from learning hurdles in regular public school classrooms. Many students find it difficult to learn mathematics, according to a number of studies (Jabeen, et al., 2022). A number of children experienced what are known as mathematical learning disorders (MLDs), which are difficulties in learning mathematics in comparison to other subjects, according to Shahzad, et al., (2023). Proficiency in mathematics may provide today's students with practical resources and methods for studying, developing, and understanding the world. The capacity to make connections between the knowledge of differentiating, examining connections, and assessing, classifying, and establishing correlations is what determines (Batool, 2019).

Precise theoretical aptitudes are a significant barrier for children with specific learning disabilities (SLDs), according to research by Khan, et al. (2023), Gulzar, & Mahmood, (2019), and Pervaiz, et al. (2023). Research has indicated that adolescents with learning difficulties exhibit unique cognitive deficits when engaging with their peers who are developing normally, in addition to perceived disappointments, even when their IQs are within acceptable norms. Mathematical learning problems (MDs) are a conjoint subtype of learning obstacles that frequently appear as

comorbidities, according to Hanif, et al. (2022). Math difficulties, including process, geometry, and algebra, can greatly contribute to a reduction in mathematical aptitude, according to Nithyanantham, (2022) and Amjad, et al., (2023). Dutta (1986) elucidated the difficulties secondary school pupils encounter when acquiring geometry and listed the several subdomains of geometry that they find difficult (Noreen, & Rana, 2019).

Bhattacharya (1986) investigated the difficulties secondary school students encountered when learning algebra. The students have trouble finding the unknown number, understanding how to solve sums, and understanding how computations involving linear equations are presented. Moshman (2004) defined "reasoning" as the act of deriving a conclusion from the available data. Díaz, et al., (2023) define reasoning as an intellectual or cognitive aptitude or capacity. Voyer (2011) concluded that students' understanding of mathematics is aided by reasoning. Saragih, & Napitupulu, (2015) assert that mathematical reasoning is a useful skill in all facets of daily life. It is therefore essential to understanding mathematics. Students who use mathematical thinking are better equipped to handle challenges in their daily lives.

The capacity to comprehend mathematical ideas and come to a logical conclusion is known as mathematical reasoning, according to Kwon, et al., (2017). Montoya & Hayes (2017) claim that mathematical thinking aids students in building solid foundations for their future academic endeavors. Ayal, et al., (2016) clarified that students can monitor the accuracy of statistics and the relationship between data and arguments to draw conclusions by using mathematical reasoning to support their understanding. According to Mueller & Yankelewitz (2014), mathematical reasoning is the ability to reason as a robust hypothetical foundation to support the process of forming new understanding.

According to Ciftci (2013), it helps students think outside of the box and use their knowledge to apply in a precise and logical way while explaining mathematical sums. Because mathematics is so vital, mathematical reasoning enables students to apply their mathematical skills. With the use of mathematical reasoning, students may evaluate situations, select methods to clarify the issue, draw logical conclusions, and apply the solution under a variety of scenarios (Jeannotte, & Kieran, 2017). According to Wang & Han (2019), mathematical reasoning enables students to understand amounts and serves as a tool for them to make assessments and form new conclusions. We frequently employ mathematical reasoning's inductive, deductive, and adductive processes.

Exceptional conceptual ability and methodical intellectual thinking with a goal or objective in mind characterise reasoning. It involves the formulation of ideas and the impact of any individual's creation of conclusions. It is a process of applying shared ideals to solve problems and intellectually link conclusions. Therefore, it is believed to be the pinnacle of thinking, with the purpose of arriving at a choice or a resolution (Primadani, 2020). Reasoning is the process of developing an original conclusion based on preexisting conclusions or conclusions that have previously been formed. It is commonly defined as finding connections between conclusions or seeing resolutions

or differences between decisions that have already been made. It is an extremely representative role. Formal logic laws, procedures, and rules are typically linked to reasoning.

All thinking comprises two steps: moving from specific facts seen to a theory, hypothesis, or generalisation, and then moving from generalisation to specific consequences. Inductive reasoning is used when a general conclusion is drawn based on specific evidence, but deductive reasoning is used when a common fact is the starting point and is connected to particular instances. As a result, it discusses how to represent inferences or recommendations derived from data.

The process of sophisticated imperative perceptive observation of reasons, trust, inferences, actions, or mental states is known as reasoning (Hasanah, et al., 2019). Generally speaking, intelligent with the implication that the process is logical and understandable, more clearly resolving the issues through the methodical ageing of well-informed hypotheses and the rational gathering of explanations.

The researchers discovered that mathematical reasoning is a more advanced ability. "The line of thought(s) that is adopted to solve tasks" is one definition of "reasoning," which is often used in the field of mathematics (Aviory, et al., 2021). Akbar, et al., (2022) states that students between the ages of 11 and 15 are at the formal operation development stage.

It is important to consider the developmental stage of teenagers at this age. Researchers are currently interested in the development of mathematical skills and reasoning abilities, as well as the pedagogy and assessment of these topics. Simultaneously, MLD is also becoming a common issue in the research domains of education, psychology, and neuroscience; consequently, the amount of published research in these domains is expanding quickly.

Objectives

- To identify the Mathematical Learning Difficulties in Content Ability of Humanities group among the Public Sector Secondary School Students of District Lahore.
- To identify the Mathematical Learning Difficulties in Mathematical Reasoning Ability of Humanities group among the Public Sector Secondary School Students of District Lahore.
- To compare the Mathematical Learning Difficulties in Content Ability and Mathematical Reasoning Ability of Humanities group among the Public sector Secondary School Students between male and female of District Lahore.
- To compare the Mathematical Learning Difficulties in Content Ability and Mathematical Reasoning Ability of Humanities group among the Public sector Secondary School Students between urban and semi-urban (rural) area of District Lahore.

Rationale

This Research was beneficial for teachers teaching mathematics to develop "Mathematical

Abilities" in the students by teaching the subject of Mathematics is the elementary purpose of mathematics syllabus. This Research was support to understand curriculum developers of the subject of mathematics to reflect students "Mathematical Abilities" as a main objective of mathematics syllabus for Humanities Group.

In the light of this research, the curriculum developers was comprehend to redefine the mathematical concepts for Humanities Group to help in raising the mathematical abilities in the students. This study was support the teachers to alter the environment of mathematics classroom. At present, the pass ratio in Mathematics (Humanities Group) at Public Sector Secondary Student is marginal in BISE Lahore exams.

In 2018 first time BISE Lahore exams conducted Mathematics for Humanities Group with the name of General Mathematics and 55.61 % students passed, next year in 2019, 53.73 % students passed. In 2020 due to COVID-19 no exams was conducted and In 2021 Accelerated Learning Programme (ALP) based exams were given. In 2022, the Mathematics for Humanities Group is 53.23 % for class X and 59.45 % for class IX.

These result in, Mathematics for Humanities Group, shows the alarming situation at secondary level examination which attract the researcher to work on this area. Secondly, due to change in paradigm shift in the domain of assessment and examination system from rote based examination system to concept bases examination system which was successfully implemented in FBISE (federal board of intermediate and secondary education) in 2022. The FBISE align on SLO based examination rather than on the textbook base.

Research Questions

- To what extent the Mathematical Learning Difficulties in Content Ability of Humanities group among the Public Sector Secondary School Students of District Lahore?
- To what extent the Mathematical Learning Difficulties in Mathematical Reasoning Ability of Humanities group among the Public Sector Secondary School Students of District Lahore?
- What is the difference in Content Ability and Mathematical Reasoning Ability of Humanities group among the Public Sector Secondary School Students of District Lahore?
- What is the difference in Content Ability and Mathematical Reasoning Ability of Humanities group among Public sector Secondary School Students between male and female of District Lahore?
- What is the difference in Content Ability and Mathematical Reasoning Ability of Humanities group among Public sector Secondary School Students between urban and semi-urban (rural) area of District Lahore?

Research Gap

Mostly, the researches were conducted on Learning Difficulties in Mathematics subject taught to the Science group students. Therefore, a gap established in the subject of Mathematics to be taught to Humanities Group students. Almost 30 % students appeared in Matriculation exams having Humanities Group in Board of Intermediate and Secondary Education (BISE) Lahore.

After 2018 all of them studied the subject called General Mathematics at secondary level. It is significant to learn the metacognitive approaches in the advancement of mathematics between secondary school students of Humanities Group. The Researcher observed that in Public sector secondary schools, the teachers focused on content ability rather than reasoning ability. The researcher also noted students' ratio of failures in mathematics Humanities Group is higher as compared to other subjects.

The literature also reveals that the failure is due to rote, memorization and cramming of mathematical formulae and questions. This situation convinced the researcher to fill the research gap. Therefore, the researcher intended to examine the identification of metacognitive strategies among secondary school students.

Research Methodology

The researcher used quantitative approach to identify the Mathematical Learning Difficulties amongst the Secondary School Students of Humanities group of District Lahore. In this unit, the researcher narrated the sample, population, research design and demographic features of the sample; for instance area and gender. Researcher too, told about the inside reliability and consistency of the research instruments; i.e. Mathematical Ability Test (MAT). Furthermore, in this unit the process of computing the reliability to determine the validity will also be presented, regarding Mathematical Ability Test (MAT). The research design of this study is descriptive. Mathematical Ability Test MAT was used to recognize Learning Difficulties in the subject of Mathematics amongst the Students of Secondary School, Humanities group of District Lahore.

The research was of quantitative type. Rahman, et al., (2022) and Yasmeen, et al., (2022) pointed out that the survey mode had abundant advantageous if the study conduct on huge geographical area. The Researcher conducted this study on a large geographical area i.e., District Lahore. The researcher selected this method for his research and established on the self-designed questionnaire. The feedback form used to recognize the Learning Difficulties in the subject of Mathematics in mathematical reasoning and content ability and aptitude of Humanities Group among the Public Sector Secondary schools students of District Lahore.

All the students of Humanities Group among the Public Sector Secondary schools students of District Lahore constituted the population for this study. The total 29,181 students was constitute as population. Data taken from Punjab government.

Table 1: Population Humanities Group Students

		Male	Female	Total
Cantonment	Urban	1251	1404	2655
	Rural	225	265	490
City	Urban	4362	5911	10273
	Rural	51	57	108
Model Town	Urban	2392	3021	5413
	Rural	246	319	565
Raiwind	Urban	807	905	1712
	Rural	510	331	841
Shalimar	Urban	2620	3855	6475
	Rural	372	277	649
Grand Total		12836	16345	29181

(**Source**: https://sis.punjab.gov.pk/.)

Petko, et al., (2020), noted during their study that the usage of random sampling does not infer hundred percent demonstrative of the population. To create the finest illustration of expand population; the cluster sampling is a worthy method to create close illustration of population. The researcher used five clusters of the District Lahore (Cantonment, City, Model Town, Raiwind and Shalimar) during the study, on the foundations of geographic limitations designed by the Provisional Government of the Punjab. At that point, the researcher prepared strata of female and male public sector secondary schools in every cluster. Furthermore, the researcher prepared two strata of semi urban (rural) and urban areas as per defined by the Government of the Punjab province. The four (04) schools will be taken from each cluster, one (1) male school from urban area and one (1) female school from urban area and one (1) male school from semi-urban/rural area and one (1) female school from semi-urban/rural area taken on the basis of highest in enrolment of students. The researcher selected twenty (20) students from each selected school. After selection of the schools, the researcher used random sampling method. Therefore, researcher received the numerical data of four hundred (400) students.

Table 2: Sampling of Secondary School (Humanities Group)

		Male	Female	Total
Cantonment	Urban	(201) 20	(183) 20	40
	Rural	(115) 20	(126) 20	40
City	Urban	(1171) 20	(1229) 20	40
	Rural	(57) 20	(48) 20	40
Model Town	Urban	(907) 20	(1052) 20	40
	Rural	(57) 20	(48) 20	40
Raiwind	Urban	(964) 20	(913) 20	40
	Rural	(300) 20	(318) 20	40
Shalimar	Urban	(1106) 20	(1229) 20	40
	Rural	(254) 20	(202) 20	40
Grand Total				400

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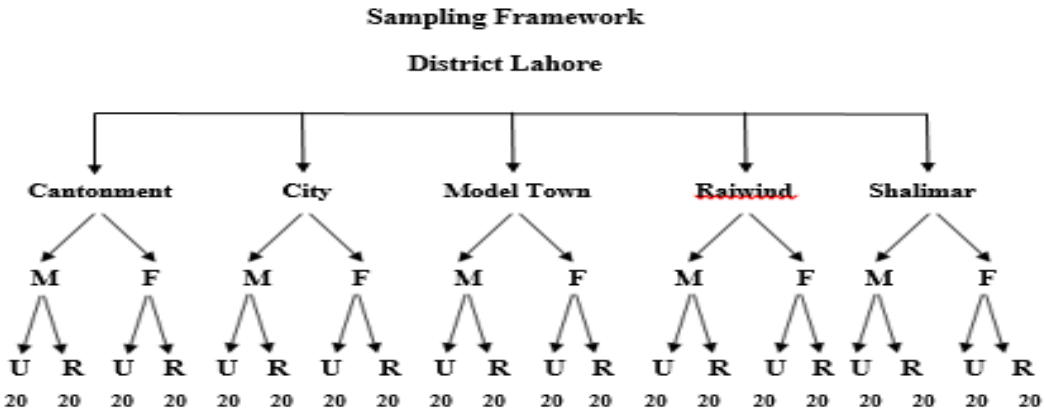

Research Instrument

Frame Work

Type	Reasoning	Resource
Selection of area of work	Identification of Domain and Topics	National Curriculum 2006 for General Mathematics
Items and Language	Four (04) Questions are selected for each topic	Past papers of BISE Lahore and International Assessment Bodies

Mathematical Ability Test (MAT)

As no standardized Mathematical Ability Test (MAT) was available that could be used to Identify Mathematical Learning Difficulties among the Secondary School Students of Humanities group. At start, the researcher listed down the number of domain and topics from the national curriculum 2006 of Mathematics at secondary level Humanities group called General Mathematics for the construction of Mathematical Ability Test (MAT).

The researcher identify the five (5) domains i.e. Numbers and Operations, Algebra Measurement and Geometry and Real life Mathematics. Twenty-five (25) topics i.e., Percentage, Ratio and Proportions , Exponents, Logarithms , Arithmetic and Geometric Series, Algebraic Formulas and Application, Algebraic Formulas and Application, Factorization, Linear Equations and Inequalities , Algebraic Manipulations, Area, Volume, Basic term of Geometry, Demonstrate Geometry , Practical Geometry, Sets and Functions , Matrices and Determinants , Basic Statistic , Linear Graph , Introduction to Co-ordinate Geometry , Zakat and Ushar, Inheritance, Business Mathematics, Financial Mathematics and Consumer Mathematics.

There learning outcomes are defined as per National curriculum 2006. They are not distributed as per sequential order in National Curriculum. The odd numbers of the items are on the base of content ability and even numbers of the items are on the base of reasoning ability. The distribution of order of items are described in table 3.

Table 3: Domains and Topics of Mathematics at secondary level Humanities group

Domain 1 : Numbers and Operations	**Domain 2 : Algebra**	**Domain 3 : Measurement and Geometry**	**Domain 4 : Information Handling**	**Domain 5 : Real life Mathematics**
1. Percentage	6. Algebraic Formulas and Application	11. Area	16. Sets and Functions	21. Zakat and Usher
2. Ratio and Proportions	7. Algebraic Formulas and Application	12.Volume	17. Matrices and Determinants	22. Inheritance
3. Exponents	8. Factorization	13. Basic term of Geometry	18. Basic Statistic	23. Business Mathematics
4. Logarithms	9. Linear Equations and Inequalities	14. Demonstrate Geometry	19. Linear Graph	24. Financial Mathematics
5.Arithmetic and Geometric Series	10. Algebraic Manipulations	15. Practical Geometry	20. Introduction to Co-ordinate Geometry	25. Consumer Mathematics

Number of Items

For any test, there is no any specific rule which can be used to construct the item. For this twenty-five (25) topic has been identifying. In order to test the two learning area content ability and reasoning ability of the same topic the researcher construct the same topic with two ranges first to identify content ability and the next item identify is to test the reasoning ability.

SELECTION OF ITEM FORMAT

Andriani, et al., (2019), it is ideal when making any standardized test using MCQs format. For measuring different areas of abilities the test must be Multiple Choice (MC) Type rather than Construct Response (CR) Type items. Per Linn and Ground (2005) stated that Multiple Choice (MC) Type is good method to measure the Ability of required learning outcomes based on topics at international levels.

Contraction of Instrument

Therefor researcher selected fifty (50) number of items from BISE Lahore past paper 2015 - 2019 and textbook review exercises adopted by PCTB to identify the content ability Secondly, to identify the reasoning ability researcher selected fifty (50) reason based items from international Assessment bodies for math test like Math Kangaroo test (Junior Level), TIMSS (Trends in International Mathematics and Science Study) and Indian maths Olympiad (for class IX and X) past paper 2015 – 2019 and other supporting material is been used . The reliability of coefficient for the Mathematical Ability Test for the students was 0.584 which was a sign of durable reliability.

Descriptive Analysis

Mathematical Learning Difficulty (MLD)

One of the objectives is to determine the content and reasoning ability in General Mathematics of

MLD at secondary school students.

Table 4: Means and Standard Deviations for Learning Difficulties among the secondary school Students in General Mathematics

		Content Ability		Reasoning Ability	
		Mean	**SD**	**Mean**	**SD**
Gender	**Male**	0.5673	0.11792	0.4405	0.10094
	Female	0.5325	0.12742	0.4459	0.10958
Locality	**Urban**	0.5951	0.10843	0.4830	0.9605
	Rural	0.5195	0.12737	0.4037	0.09829

From the table 4, it is inferred that mean and standard deviation for content ability and reasoning ability to entire sample of gender are 0.5499 and 0.122679 as well as 0.4432 and 0.10526 respectively. Mean and standard deviation for content ability and reasoning ability to entire sample of locality are 0.5573 and 0.1179 as well as 0.4434 and 0.5294 respectively. By using Mean ± SD, the level of MLD in terms of content ability and reasoning ability among secondary school students is categorized to low, moderate and high.

Table 5: Level of MLD among the secondary school Students in General Mathematics

		Low	**Moderate**	**High**
Learning Difficulties	**Content Ability**	0.20	0.56	0.84
	Reasoning Ability	0.08	0.44	0.76

From the table 5 , it is inferred that overall, 0.84 (84 %) secondary school Students in General Mathematics are having high level in Content Ability; 0.56 (56 %) secondary school students in General Mathematics are having moderate level in Content Ability ; 0.20 (20%) secondary school Students in General Mathematics are having low level in Content Ability and overall 0.76 (76 %) secondary school Students in General Mathematics are having high level in Reasoning Ability; 0.44 (44%) secondary school students in General Mathematics are having moderate level in Reasoning Ability ; 0.08 (8%) secondary school Students in General Mathematics are having low level in Reasoning Ability.

Table 6: Frequency among the secondary school Students in General Mathematics

		Frequency	**Percentage**
Level of Learning Difficulties	**Low**	60	17.4
	Moderate	175	50.9
	High	109	31.7
		344	**100**

Form above table, it is inferred that the 60 of secondary school Students in General Mathematics have low level of learning difficulty, 175 of them have moderate level of MLD and 109 of them have high level of MLD.

Hence, result reveals that most of secondary school Students in General Mathematics has moderate level of MLD.

Content Ability

One of the objectives is to conclude the level of reasoning ability of the students of secondary school in General Mathematics The mean and standard deviation of content ability of the secondary school Students in General Mathematics are shown in Table 7.

Table 7: Content Ability of Means and Standard Deviations of secondary school Students in General Mathematics

Variable		Frequency	Mean	SD
Gender	**Male**	175	0.5673	0.11792
	Female	149	0.5325	0.12742
Locality	**Urban**	172	0.5951	0.10843
	Rural	172	0.5195	0.12737

Commencing the above table 7, it is concluded that mean and standard deviation for content ability to entire sample are 0.5536 and 0.12029 respectively. By using range of scores, the level of content ability of secondary school students in General Mathematics is categorized into very low, low and moderate levels.

Table 8: Levels of Content Ability among the secondary school Students in General Mathematics

Variable	Level of Content Ability	Range of Score	Frequency	Percentage
Content Ability	**Low level of Content Ability**	0.20	1	3
	Moderate Level of Content Ability	0.55	36	13
	High Level of Content Ability	0.84	2	6

Reasoning Ability

One of the objectives is to determine the level of reasoning ability of the secondary school Students in General Mathematics The mean and standard deviation of Reasoning ability of the secondary school Students in General Mathematics.

Table 9: Reasoning Ability of Means and Standard Deviations of secondary school Students in General Mathematics

Variable		Frequency	Mean	SD
Gender	**Male**	175	0.4405	0.10094
	Female	149	0.4459	0.10958
Locality	**Urban**	172	0.4830	0.9605
	Rural	172	0.4037	0.09829

Commencing the above table 9, it is concluded that mean and standard deviation for reasoning ability to entire sample are 0.4433 and 0.3173 respectively. By using range of scores, the level of reasoning ability of secondary school students in General Mathematics is categorized into very low,

low and moderate levels.

Table 10: Levels of Reasoning Ability among the secondary school Students in General Mathematics

Variable	Level of Reasoning Ability	Range of Score	Frequency	Percentage
Reasoning Ability	Low level of Reasoning Ability	0.08	1	3
	Moderate Level of Reasoning Ability	0.44	45	13.1
	High Level of Reasoning ability	0.76	1	3

Inferential Analysis

The inferential analysis was carried out with 3 null hypotheses shown in following sections. Difference between two groups in the mean scores of variables are studied using *t*-test are discussed in these sections.

Learning Difficulty

Research question three and four sought to determine differences in the characteristics of MLD for secondary school students by gender and locality of school. This research question has been addressed specifically from null hypotheses 3 and 4 in the following section.

Gender and Learning Difficulty

Table 11: Significance of Difference between Male and Female secondary school students in their Level of Learning Difficulty

Dependent Variable	Abilities	Gender				t-value	P-Value
		Male		Female			
		Mean	SD	Mean	SD		
Learning Difficulties	Content Ability	0.5673	0.1792	0.5325	0.52742	0.068	0.07
	Reasoning Ability	0.4405	0.10094	0.4459	0.10958		

Significance at the 1% level

Commencing the above table 11, it is concluded that the "*t* values" are significant at 1% level, accordingly the null hypothesis - 3 is not accepted with regard to two abilities of MLD-Content Ability and Reasoning ability and in the composite score of MLD and male and female secondary school secondary level students. Hence, there is significance difference between male and female secondary school level students with regard to two abilities of MLD such as Content Ability and Reasoning Ability in the composite score of learning difficulty. Specifically, the results reveals that the male secondary school secondary level students are having high mean scores of MLD in terms of content ability and reasoning ability than those of their female counterparts. In the present study gender is an influential factor of learning difficulty.

Table 12: Significance of Difference between Urban and Rural secondary school students in their Level of Learning Difficulty

Dependent Variable	Abilities	Locality				t-value	P-Value
		Urban		Rural			
		Mean	SD	Mean	SD		
Learning Difficulties	Content Ability	0.5951	0.10843	0.5195	0.12737	3.757	0.000
	Reasoning Ability	0.4830	0.9605	0.4037	0.09829		

Significance at the 1% level

From the above table, it is noticed that the "t values" are significant at 5% level, accordingly the null hypothesis - 3 is not accepted with regard to two abilities of MLD-Content Ability and Reasoning ability and in the composite score of MLD and urban and rural secondary school secondary level students. Hence, there is significance difference between male and female secondary school level students with regard to two abilities of MLD such as Content Ability and Reasoning Ability in the composite score of MLD. Specifically, the results reveals that the male secondary school secondary level students are having high mean scores of MLD in terms of content ability and reasoning ability than those of their rural counterparts. In the present study locality is an influential factor of MLD.

Discussion

After reviewing the data analysis for this research study it was noticed that there were several area like Percentage, Ratio and Proportions, Exponents, Logarithms, Arithmetic and Geometric, Algebraic Formulas and Application, Algebraic Formulas and Application, Factorization, Linear Equations and Inequalities, Algebraic Manipulations, Area, Volume, Basic term of Geometry, Demonstrate Geometry, Practical Geometry, Sets and Functions, Matrices and Determinants, Basic Statistic, Linear Graph, Introduction to Co-ordinate Geometry, Zakat and Ushar, Inheritance, Business Mathematics, Financial Mathematics and Consumer Mathematics in which students faced learning difficulties. This idea has also been supported by the different researches. The educational psychologist Ormrod, (2019) mentioned that General Mathematics most likely causes more confusion and frustration for most of the students, than any other subject in the school curriculum. Mainly, the sequential and hierarchical structure of General Mathematics subject is difficult to understand by the student who cannot get good grip on the early concepts and skills of mathematics at primary level. This is the mean source of increasing difficulties in new and more demanding material is continuously introduced in the subject of General Mathematics. Students having learning difficulties in the subject of General Mathematics tend to give up all their trust on understanding what arithmetic is about, and get inclined towards repetition memorization of meaningless facts, techniques, symbols and processes. Surprisingly, the large number of such students additionally builds up an unusually negative view of the subject of General Mathematics, which enhances the problematic scenario of their learning in the subject of General Mathematics

(Bhardwaj, 2023).

General Mathematics is hierarchical and sequential subject in which many concepts and ability are inter-related and initial concepts and ability become the basis of further learning. The reason behind the students facing learning difficulties in the subject of General Mathematics may be the inappropriate curriculum, which is not compatible with the developmental stages of the students. It needs to be improved according to the developmental stages as per suggested by the psychologists and curriculum experts. Poor quality teaching and instructional process may be among the reasons behind the learning difficulties among students in the subject of General Mathematics at secondary level. Prime element of the teaching is the content understanding of the teacher, which is very poor in most of the schools at elementary level. Most specifically the female teachers at the primary level have very poor content knowledge in the subject of Mathematics (Education, 2021). Pedagogical skills of the teacher, which play a fundamental role in the learning of the students, may have many question marks as far as the competency level is concerned. Teachers are not using visual or pictorial aids on concrete material to provide the starting point for the development of concepts and ability (Mishra, et al., 2020). Interactive teaching in the class with high level of participation of students may be missing. Teachers do not have the sufficient in-service training for development students' abilities and correlate the knowledge with the practical life of students. It is due to this deficiency, connections between mathematical knowledge and real life problems may not be established.

Teachers teaching General Mathematics to the grade IX-X at secondary level do not have the sufficient training regarding the teaching of the subject of General Mathematics. Lack of the continuous professional development may be one of the reasons for learning difficulties, which students face in the subject of General Mathematics at elementary level (Steele, 2020). Understanding of students in numbers and operation concepts is good as compared to the other skills such as algebra, and geometry related concept, which is due to the rote learning of the students Kothari (1985). Understanding of mathematical concept in female students has lesser as compared to the male students in the subject of General mathematics, which is 0.5499 and 0.4432 respectively. The reason may be the negative attitude of female students towards the subject of General Mathematics, which is supported by the different research studies. It is also supported by the researches that the male are naturally better than female in General Mathematics. Moreover, the female are less logical as compared to the male.

There is a significant difference in the performance of students from rural and urban areas residence. Ma et al., (2020) reported that the rural students always perform worse as compared to the urban students. The reason may be the environmental factors, lack of facilities, educational environment, interaction with the people, teaching staff qualification, less interaction with advance community etc. McCracken, Barcinas, (1991) also reported that there is a huge difference in the understanding of the urban and the rural students whereas the students from rural areas were performing less as compared to the urban students. This may be due to the low-income group,

difference in community interaction, school characteristics, teaching staff academic and professional qualification, and number of facilities etc.

Conclusions

The correlation coefficient for the all five mathematical domains of Numbers and Operation, Algebra, Measurement and Geometry, Information Handling and Real life Mathematics are 0.34 (34 %), 0.25 (25 %), 0.29 (29 %), 0.33 (33 %), and 0.36 (36 %), respectively, which are significant at 5% level of significance. There was a statistically significant difference of the five mathematical domains of Numbers and Operation, Algebra, Measurement and Geometry, Information Handling and Real life Mathematics and in the overall Mathematical Ability Test of General Mathematics. There was a significant difference in the five mathematical domains of Numbers and Operation, Algebra, Measurement and Geometry, Information Handling and Real life General Mathematics of the respondents on the basis of their gender which shows that the students living in male have strong conceptual background of concepts of Math concepts as compared to those living in the female. There was a significant difference in the five mathematical domains of Numbers and Operation, Algebra, Measurement and Geometry, Information Handling and Real life Mathematics of the respondents on the basis of their area which shows that the students living in rural areas have strong conceptual background of concepts of Math concepts as compared to those living in the urban areas.

Recommendations

Following recommendations were made on the results and conclusions:

- The schools should make necessary arrangement in the classrooms to avoid the situation of background noise or visual stimulation that affect learning of secondary school students.
- The teachers must interact with secondary school students, in order to their learning skills by employing multiple teaching and learning strategies.
- The teachers should give mathematical problems for practices regularly with appropriate level of home work for their secondary school students.
- The teachers must teach secondary school students about shortcut methods to solve the mathematical problems.
- The teachers should teach their secondary school students for avoiding impulsive responses without considering consequences.
- The mathematical learning sessions must be planned by teachers in view of short attention span difficulty in concentration among secondary school students.

- The teachers should take special attention to avoid difficulty in General Mathematics in hearing differences between similar concepts and the doubts of secondary school students must be clarified by the teachers immediately.

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